Reprinted from RHODORA, Vol. 45, March–May, 1943

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY

CXLVII

THE BROAD-LEAVED SPECIES OF POTAMOGETON OF NORTH AMERICA NORTH OF MEXICO

E. C. OGDEN

DATES OF ISSUE

Pages 57–105 and Plates 746–748 . . . . . 18 March, 1943
Pages 119–163 . . . . . 10 April, 1943
Pages 171–214 . . . . . 1 May, 1943

MISSOURI BOTANICAL
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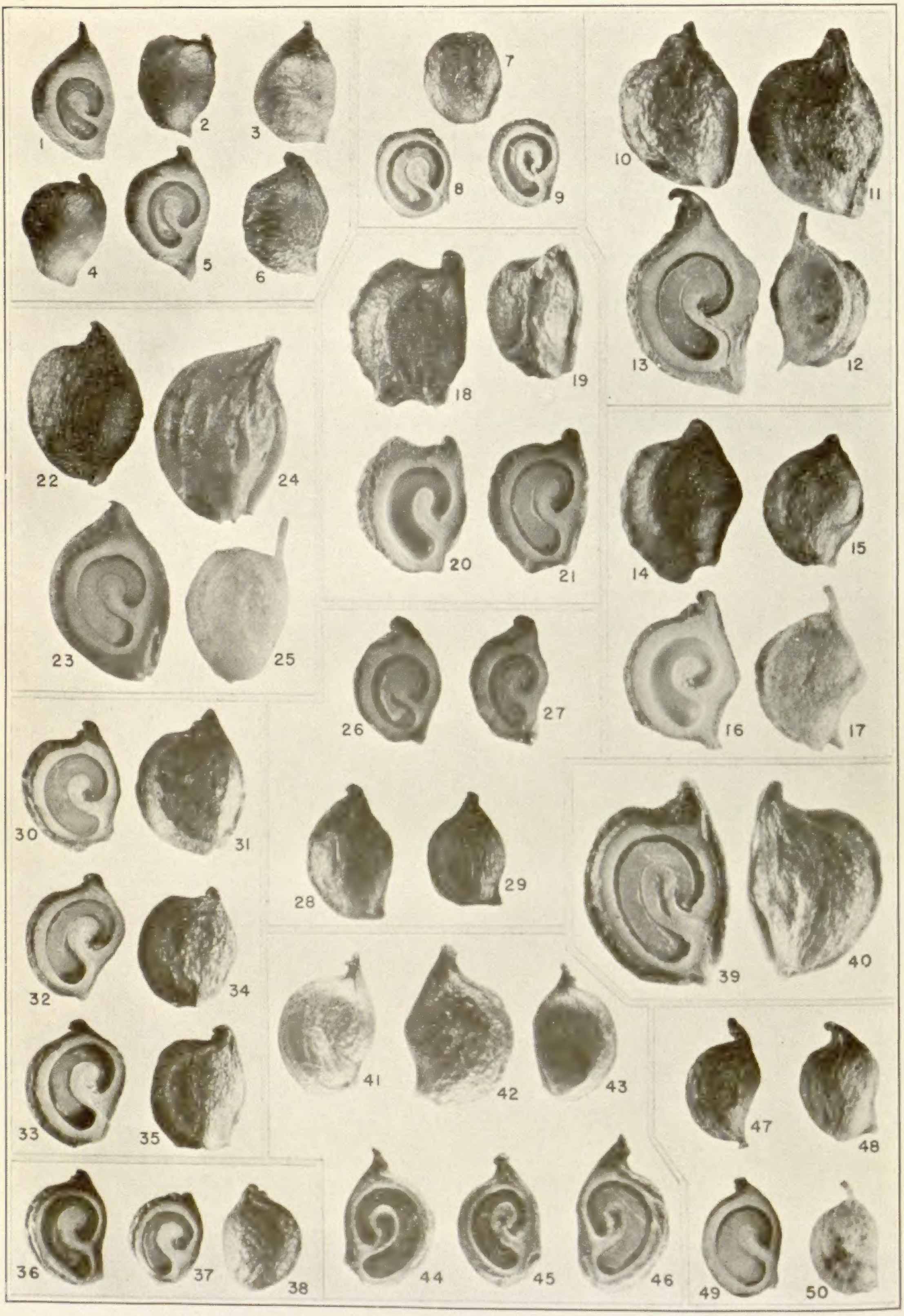

FRUITS OF POTAMOGETON, × 5

P. ALPINUS var. TENIFOLIUS, figs. 1–3; P. ALPINUS var. SUBELLIPTICUS, figs. 4–6; P. POLYGONIFOLIUS, figs. 7–9; P. AMPLIFOLIUS, figs. 10–13; P. PULCHER, figs. 14–17; P. NODOSUS, figs. 18–21; P. NATANS, figs. 22–25; P. OAKESIANUS, figs. 26–29; P. ILLINOENSIS, figs. 30–35; P. GRAMINEUS, figs. 36–38; P. PRAELONGUS, figs. 39 and 40; P. RICHARDSONII, figs. 41–46; P. PERFOLIATUS var. BUPLEUROIDES, figs. 47–50.

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THE BROAD-LEAVED SPECIES OF POTAMOGETON OF NORTH AMERICA NORTH OF MEXICO

E. C. Ogden

(Plates 746–748)

The genus *Potamogeton* is of world-wide distribution. Because it exhibits a great range of environmental variation, and specimens so often lack the fundamental diagnostic parts which might ally them with already known entities, the names that have been coined for its members are legion.

Although a number of monographic treatments have dealt with the North American species in whole or in part[1], the broad-leaved groups have been poorly understood. The really usable treatment of the troublesome linear-leaved species by Fernald lent new hope to the idea that possibly the broad-leaved plants

[1] Thomas Morong, The Naiadaceae of North America, Mem. Torr. Club **3**: no. 2 (1893).

P. Ascherson and P. Graebner, in Engler, Pflanzenr. **4**: fam. 11, Potamogetonaceae (Potamogeton by Graebner) (1907).

Norman Taylor, in N. Am. Fl. **17**: pt. 1 (1909).

J. O. Hagström, Critical Researches on the Potamogetons, Kungl. Svenska Vetenskapsakad. Handl. **55**: no. 5 (1916).

Harold St. John, A Revision of the North American Species of Potamogeton of the Section Coleophylli, Rhodora, **18**: 121–138 (1916).

M. L. Fernald, The Linear-leaved North American Species of Potamogeton, Section Axillares, Mem. Amer. Acad. Arts & Sci. **17**: pt. 1 (1932). As this work contains an excellent discussion of the previous treatments, an historical introduction would merely be repetitive and is unnecessary here.

might be resolved into something approaching an expression of their true relationships.

A fertile *Potamogeton* seldom causes great difficulty; but the great mass of sterile material, displaying a range of form unknown in the fertile plants, has made an understanding of the group difficult. To add to the confusion, the broad-leaved species, with their spikes buoyed up above the water, hybridize more or less freely, rendering it difficult in many cases to determine the fundamental cause behind the abnormality.

The following treatment is offered in the hope that the species here considered may be better understood; and that specimens may be properly identified, even though they lack many of the important diagnostic characters and exhibit forms that are far from typical.

Diagnostic Characters

Fruits. When mature fruits are present there is seldom any difficulty in referring the specimen to the proper species. Unfortunately the presence of fruit is not the rule but the less common occurrence. Most distinctive are those of *P. alpinus*, with a smooth, hard, eggshell-like exocarp, tawny-olive in color; fruiting specimens can never be mistaken for any other species. Neither can the minute reddish orbicular fruits of *P. polygonifolius* with their beaks practically obsolete, nor the massive fruits of *P. praelongus* be confused with those of any other North American broad-leaved species. The long-beaked fruits of *P. crispus* are especially characteristic. Extremely important diagnostic characters are the prominence of keels and the color of the exocarp. If one makes a longitudinal section with a razor-blade, the amount of curvature of the seed becomes apparent and is of some slight diagnostic value. More important in some cases, and surprisingly consistent, is the presence or absence of a cavity in the endocarp tissue that projects as a fold into the center of the fruit. This projection (endocarp loop) is solid in all the broad-leaved species except *P. polygonifolius*, *P. praelongus* and *P. Richardsonii*. This is an important character in the separation of *P. Richardsonii* from *P. perfoliatus*, specimens of which often strongly resemble each other. Because the fruits are of great taxonomic importance, but difficult ade-

quately to describe, it has seemed desirable to illustrate them (see PLATE 746).

FLOWERS. It is now generally considered that *Potamogeton* has no true perianth. The sepal-like structures are thought to be outgrowths from the connectives of the stamens, and are called sepaloid connectives.[1] In the species here treated they are of little or no diagnostic value. Careful observations on the shape and hundreds of measurements on the width and length of claw have been made, from which it has become evident that even species which in most characters are strikingly different have sepaloid connectives which are surprisingly similar. The anthers, also, are of about the same shape and size in all the broad-leaved species, except that in *P. polygonifolius* they average somewhat smaller. Pollen-grains should be examined when hybridism is suspected. Fertile species have pollen-grains well formed and abundantly produced, whereas hybrids invariably have a large percentage aborted.

SPIKES. While the flowering spikes are of little diagnostic value, differing chiefly in average size and in number and degree of crowding of the whorls of flowers, the diameter of the fruiting spikes can be used. This thickness is almost entirely dependent on the length of the fruits, but in many cases the fruit-measurements cannot be so easily obtained. While there are some differences as to length of the spikes of different species, these are mostly a direct correlation with the robustness of the species, and their diagnostic value is therefore secondary.

PEDUNCLES. Characters of the peduncle can usually not be used for the determination of broad-leaved species without supporting characters from other parts of the plant, due to the great variation within the same species, but they are sometimes of useful supplementary value. Most species seldom have peduncles over 10 or 15 cm. long, but in *P. amplifolius* they may run up to 30 cm. and it can then be distinguished from *P. pulcher* or *P. nodosus*, which at times it may superficially resemble. Similarly, *P. Richardsonii* may have peduncles up to 25 cm. in length, in contrast to its nearest relative, *P. perfoliatus*, with peduncles less than 10 cm. long. The longest peduncles are

[1] Phylogenists are not agreed on this. These structures may well represent a normal perianth with the anthers sessile on the claws of the segments.

found on *P. praelongus*, where they are often more than 30 cm. and may attain a length of 60 cm. The three species mentioned as sometimes having long peduncles (*P. amplifolius*, *P. praelongus*, and *P. Richardsonii*) may also have them short; but whether long or short, usually with a tendency to be clavate. This tendency for the peduncles to be thickened upward is also somewhat characteristic of the subsection *Lucentes*. Most of the species here treated have their peduncles rather uniform in thickness throughout their length. Another character of slight value is the thickness of a peduncle in comparison with the thickness of the stem at the internode directly below. This has some supplementary value in the subsection *Natantes*, where *P. natans* has peduncles about the same thickness as the stem, while *P. Oakesianus*, with its slenderer stem, has less reduction in the thickness of its peduncles, and as a consequence has them thicker than the internode below. Lastly, there are some differences in their internal anatomy. These are, however, few and inconstant and not used in this treatment.

Stipules. In all of the species here treated (with the exception of *P. crispus*) the stipules are free from the leaves. They clasp the stem, but have their margins absolutely free and ununited. They are all obtuse, at least when young, but as there is often a tendency for them to be somewhat cucullate they may, at times, appear to be acutish. This is especially true of *P. nodosus*. All are more or less two-keeled (when mature) except in the subsections *Crispi*, *Colorati*, *Praelongi*, and *Perfoliati*. The chief differences are in their length and coarseness, which are, for the most part, rather direct correlations with the robustness of the species. They furnish useful characters in the perfoliate-leaved species where one can usually recognize *P. praelongus* by its large white stipules, *P. Richardsonii* by its stipules reduced to strong white fibers, and *P. perfoliatus* with stipules delicate and inconspicuous.

Leaves. Certainly some of the most important diagnostic characters for the identification of the broad-leaved species of *Potamogeton* are to be found in the leaves, for too often all that are available are stems and either submersed or floating leaves, or both. At least three fourths of the specimens in the herbaria lack not only mature fruits but any part of an inflorescence.

The stipules often shrivel and decay, so that the few remnants (if any are left) are insufficient for diagnostic purposes. Rhizomes are seldom collected and when present are of but slight taxonomic value. Thus, unless one resorts to the internal anatomy of the stem, it is, in the great majority of cases, necessary to determine the specimens from the leaves. These may be either submersed or floating, or both, in all the subsections except *Crispi*, *Praelongi*, and *Perfoliati*, which have only submersed leaves. These three subsections always have sessile perfoliate-clasping leaves[1] with broad bases in contradistinction to the other subsections which have their submersed leaves petioled or at least narrow at base.

First considering the submersed leaves: their shape is of primary importance. When typically developed, *P. perfoliatus* can be recognized immediately by its short-ovate leaves; *P. Richardsonii* by having them ovate-lanceolate; *P. praelongus* with them oblong and cucullate at the apex; the members of the *Lucentes* by the sharp-pointed apices; *P. natans* and *P. Oakesianus* by their coarse and delicate, narrowly linear leaves, respectively; *P. nodosus* by its long-petioled lanceolate leaves gradually tapering at both ends; *P. pulcher* having distinctive lanceolate leaves abruptly tapering to a petioled base; *P. amplifolius* with its massive leaves conspicuously arcuate; and *P. alpinus* with obtuse apex and sessile base. Unfortunately, however, it is not always as simple as that. These leaves exhibit such a wide range of variation[2] from the typical and are often in such a poor state of preservation, if not entirely absent, that one must resort to other parts of the plant for diagnostic characters. The leaf-margin of *P. crispus* is finely but evidently toothed; in the other broad-leaved species the leaf-margins are strictly entire, except in the *Nodosi*, which have 1-celled denticles so extremely fugacious as to be found only in the youngest leaves; the *Perfoliati*, in which the 1-celled denticles are more persistent; and the *Lucentes*, with strongly developed denticles. None of the indigenous North American species with free stipules has a dentation visible to the unaided eye, consequently they should

[1] The hybrid *P. gramineus* × *perfoliatus* var. *bupleuroides* may have perfoliate submersed leaves and also floating leaves.

[2] See discussion under VARIATION.

never be confused with *P. crispus*, a species naturalized from Europe, which has an evident serrulation.

Turning to the floating leaves, we find at first glance a discouraging similarity. With the exception of *P. alpinus*, which has delicate, lacunate floating leaves the blades of which taper without sharp distinction into the petiole, all seem to possess the common ovate-elliptic shape and have the same blunt mucro at the apex. When typically developed, however, we find some help in the bases of the blades. Their shape ranges from cordate in *P. natans* and *P. pulcher* to rounded in *P. Oakesianus* and *P. amplifolius* to cuneate in *P. nodosus* to tapering without sharp distinction into the petiole in *P. alpinus*. Yet, the range of variation is so great in any one species that the shape of the leaf-base must be used with caution. Even *P. natans* with its strongly cordate leaf-bases may under certain conditions have them narrowly cuneate.[1] The number of nerves is of primary importance in the case of *P. amplifolius*, which has them very numerous and close together. The size and shape of the stomates appear to be rather uniform, and while there is some variation as to the number in a given field, this appears to be influenced by factors which are ecological rather than genetic. Examination as to number and condition (whether functional or closed by cuticle) may be useful in determining whether the abnormality of some floating leaves is due to genetic or to ecological factors.

Stem. For a genus which varies so considerably due to ecological conditions, and which is so often found lacking parts that have the essential diagnostic characters, it is exceedingly fortunate that there are good characters in the anatomy of the stem. These were apparently first noticed and their importance realized by Raunkiaer[2] who used them in his studies on the Danish species and then extended his "anatomical investigations also to foreign species, intending to bring about a new and better basis for an eventual monograph of the genus *Potamogeton*."[3] In 1907, Chrysler[4] elaborated further on the anatomy of the

[1] See discussion under P. NATANS.

[2] C. Raunkiaer, De danske Blomsterplanters Naturhistorie, Bind 1, Enkimbladede, p. 32–110 (1895–1899).

[3] C. Raunkiaer, Anatomical Potamogeton-Studies and *Potamogeton fluitans*, Bot. Tids. 25: 254 (1903).

[4] M. A. Chrysler, Bot. Gaz. 44: 161–188 (1907).

central cylinder, explaining the phylogenetic relationships of the various types. Hagström in his monograph[1] emphasized the taxonomic value of the anatomical characters, especially of the stem, laying great stress on the types of endodermi, of which he described six kinds, and on the arrangement of bundles in the stele of which he described and illustrated six patterns. Other characters used by him include: the development of mechanical tissue, the presence or absence of a cortical layer directly beneath the epidermis and acting as a supporting layer to it (hypoderma), and the length in proportion to width of the cells of the epidermis.

An examination of hundreds of stems has shown that a number of the characters have real diagnostic and phylogenetic value. These are discussed below.[2] Although it has been suggested that the extent of mechanical tissue present is dependent on whether the plant grows in still or running water,[3] Raunkiaer[4] and Chrysler[5] show that no such correlation can be drawn. Hagström, too, in his Critical Researches, repeatedly shows for many species that the habitat does not affect the essential characters of the stem-anatomy. An aquarium-plant of *P. natans* which I grew from a seed had its mechanical development not at all lessened.

A morphological character of some importance is the degree of branching of the stem. The members of the subsections *Lucentes* and *Perfoliati* are usually much branched; *P. praelongus* of the *Praelongi* and *P. Oakesianus* of the *Natantes* are commonly branched; *P. natans* of the *Natantes* and the members of the *Nodosi*, *Amplifolii*, *Colorati* and *Alpini* are rarely branched, and then usually only slightly so in the upper part of the plant late in the season.

The rhizome appears to offer no important diagnostic characters, at least when dried. Some species tend to have dark-colored (usually reddish) spots on their rhizomes, while others are unspotted, but this is rather inconstant.

[1] J. O. Hagström, Crit. Res. Pot. (1916).

[2] See Explanation of Stem-anatomy Characters used in this Treatment.

[3] S. Schwendener, Das mechanische Princep in anatomischen Bau der Monocotylen, p. 122 (1874).

[4] C. Raunkiaer, Bot. Tids. **25**: 275 (1903).

[5] M. A. Chrysler, Bot. Gaz. **44**: 169 (1907).

Winter Buds. With the exception of *P. crispus*, winter buds are so uncommon among the species here treated as to be of little or no diagnostic value. They have been so ably discussed by Professor Fernald[1] that further remarks are quite unnecessary.

Variation

It is well known that in vegetative characters any broad-leaved species of *Potamogeton* varies considerably. Those of the subsections *Lucentes* and *Perfoliati* have a wide range of variation and all of the species here treated have a variability which is evident. Morong bewailed this characteristic of the group and felt that "so protean are their forms, so eccentric their action, constantly changing under changed conditions of season and water" that he must put forth his treatment "with great diffidence".[2] Chamisso and Schlechtendal[3] had earlier reached the conclusion that, to use the translation of Emmeline Moore[4], "Species of Potamogeton changing their habit seem often to pass into others, and feigning the habit of other species baffle research."

Certain of these differences in form are undoubtedly genetic, but for many the evidence that they are ecological is very strong. Numerous observations and experimental studies have shown that individual plants of certain of the broad-leaved species exhibit a variation that is almost unbelievably wide, not only including many named varieties but even simulating other species. Noteworthy among such experimental studies are those of Esenbeck,[5] whose great contribution from the standpoint of taxonomy was in demonstrating that leaf-shape varies greatly under varying conditions of nutrition and changes of water-level. In general, poor nutrition appeared to give the following sequence of events: the broad floating leaves become increasingly narrower, finally disappear and are replaced by the submerged type, which in turn may be reduced to phyllodia.

[1] M. L. Fernald, Mem. Am. Acad. Arts & Sci. **17**: pt. 1: 18 (1932).
[2] Thomas Morong, Mem. Torr. Club **3**: no. 2: 2 (1893).
[3] Chamisso and Schlechtendal, Linnaea, **2**: 159 (1827).
[4] Emmeline Moore, The Potamogetons in Relation to Pond Culture, Bull. Bur. Fish. **33** (1913): 256 (1915).
[5] Ernst Esenbeck, Beiträge zur Biologie der Gattungen Potamogeton und Scirpus, Flora **107**: 151–211 (1914).

Fryer's experiments with the broad-leaved species which he grew in tubs caused him to prefer a very conservative treatment of the group.

Of outstanding importance in this connection is the work of the Pearsalls[1] who found that variation in size and shape of leaf was due to many factors, acting independently or together. Their results led them to the conclusion that a conservative treatment is the sane one.

While it is known that many of the variations are strictly ecological and one can in many cases name the contributing stimuli, it must be admitted that certain of these differences in form may be genetic. It is often difficult to distinguish from herbarium specimens alone which is the primary cause. When such variants appear to be mere forms or states, without separate geographic ranges, and especially when it is reasonable to suppose that the variations might be caused by ecological factors, it seems wise to refrain from giving them formal rank in our system of nomenclature. In the words of Fryer, "we should not confound temporary states with permanent varieties . . . In looking over an extensive series of dried specimens of any Potamogeton, it is easy to select very distinct looking forms, and as easy to give varietal names to them; this is the method that has been followed by most of the writers on the genus, and I regret to say is still being followed, with the result of confusing rather than elucidating an already too difficult subject."[2]

Hybridism

In dealing with broad-leaved species of *Potamogeton*, one is dealing with plants that are usually sterile, which are highly susceptible to ecological variation and which hybridize freely.

If one classifies all the fruiting specimens, then correlates with them all the sterile plants the vegetative parts of which show their relationships to the fruiting entities, one still has a great mass of material that fits nowhere. Any attempt to understand such material must determine for each specimen whether the variation is genetic or ecological or due to hybridism. Here the internal anatomy of the stem will prove of great assistance and

[1] W. H. Pearsall & W. H. Pearsall, Journ. Bot. 61: 1–7 (1923).
[2] Alfred Fryer, Pot. Brit. Isles, p. 41 (1900).

often will allow the specimen to be rather definitely placed. But many times the stem-anatomy shows an upset; this points toward hybridism, for the species based on fruiting specimens show a stem-anatomy that is remarkably uniform, and repeated observations have shown that ecological factors do not affect the anatomical characters of the stem; neither will minor genetic variations. But one cannot merely say "hybrid," as an easy way out of a difficulty; one should name the parents, usually not an easy thing to do.

Whether experimental studies will produce data of value in this connection, I am not prepared to say. Hagström thought not, saying, "The hybrids must be studied according as Nature produces them. Cultivation and experiments in hybridization may not lead to great results as to the solution of this intricate question."[1] To this, Bennett retorts, "having seen the results of the late Alfred Fryer's work in this direction, I consider cultivation is a very great help—anyhow it affords a negative to some of the proposed hybrids given."[2]

Very little seems to be known about the chromosome number of *Potamogeton*. Wiegand[3] reported a haploid number of seven, or possibly eight, for *P. foliosus*. Wisniewska[4] states that the haploid number for *P. perfoliatus* is probably ("wahrscheinlich") twenty-four. The only other reported count is in Tischler,[5] where the haploid number for *P. fluitans* (*P. nodosus*?) is given as twenty-six, referring to Kuleszanka 1934, without citing any publication. Such data promise interesting results from counts on the species in this genus.

Cytological material (young pollen) of several species which I have examined shows that the chromosome number varies (at least four different numbers) in different species, although absolute counts could not be made.

In the present work, the hybrids are taken up at the end of the general treatment. Only those that strongly simulate the subsections here specially treated are discussed.

[1] J. O. Hagström, Crit. Res. Pot. 12 (1916).
[2] A. Bennett, Journ. Bot. **55**: 115 (1917).
[3] K. M. Wiegand, Bot. Gaz. **28**: 328–359 (1899).
[4] Ewa Wisniewska, Acta Societatis Botanicorum Poloniae **8**: 157 (1931).
[5] G. Tischler, Tab. Biol. Period. 5 & 6, Nachtrag no. 2, Teil no. 2, p. 99 (1935–36).

Acknowledgments

In a study of this nature I have naturally found it convenient to accept the assistance and suggestions so kindly offered by many people. I am especially grateful to Prof. M. L. Fernald under whose guidance the study was conducted and who, by his clear knowledge of the difficulties involved, offered invaluable suggestions. Also to Mr. C. A. Weatherby for his helpful advice, especially concerning nomenclature, I am deeply thankful. Thanks are also due to the members of the Gray Herbarium staff who have so willingly helped with various details; to Prof. F. H. Steinmetz, of the University of Maine, who has taken a keen interest in the work and has assisted greatly in the collecting of material; to my wife, Edith B. Ogden, for assistance in many ways; and to the curators of the herbaria from which plants have been borrowed.

Herbarium material has been seen from the following sources: Gray Herbarium (G), New England Botanical Club (NE), New York Botanical Garden (NY), United States National Museum (US), Field Museum (F), Missouri Botanical Garden (M), Dudley Herbarium, Stanford University (S), Michigan State College (MSC), National Museum, Ottawa, Canada (C), University of Montreal (MT), Private herbarium of Marie-Victorin (V), University of Maine (ME), Portland [Maine] Society of Natural History (P), University of New Hampshire (NH), C. C. Deam (D), private herbarium, E. C. Ogden (O).

Explanation of Stem-anatomy Characters used in this Treatment

Five sets of characters are used, combinations of which should determine the species. These are: the arrangement of bundles in the stele, the type of thickening of the cells of the endodermis, the presence or absence of bundles in the interlacunar spaces of the cortex (interlacunar bundles), the presence or absence of bundles just underneath the epidermis (subepidermal bundles), and the presence or absence of a layer or layers of cells directly underneath the epidermis (pseudo-hypodermis). See PLATE 747.

One of the most important sets of characters is that of the

arrangements of bundles in the stele. These fall into six types. The arrangement called the proto-type (because it appears to be the type from which the others are derived) is illustrated by PLATE 748, FIG. 1. Here the bundles are all free and un-united (each having one patch of phloem), four of them being median and with usually three to five on each side. When this arrangement is found, the specimen will belong to one of the subsections: *Colorati*, *Amplifolii*, *Lucentes*, or *Praelongi*. In the trio-type (FIGS. 2 & 3) three of the median bundles have united to form a bundle "trio", giving only two median bundles, one of them with a patch of phloem on the outer face of the xylem canal and two patches of phloem on the inner face (FIG. 2), or by a further union having only one inner patch of phloem (FIG. 3). The trio-type is always found in the subsections: *Alpini*, *Nodosi*, *Natantes* and *Perfoliati*. Members of the subsection *Lucentes* may also have the trio-type of stele. A further reduction in the number of bundles is brought about by the fusion of the lateral bundles and as this invariably results in an oblong-shaped stele it is called the oblong-type. The two median bundles may remain separate (FIG. 4) and even the lateral bundles may at times be scarcely united but merely crowded together. The oblong-type with two median bundles is found in the subsection *Lucentes*, and is prevalent in hybrids having a member of the *Lucentes* as one of the parents. A fusion of the two median bundles is accompanied by the more or less complete fusion of the laterals on each side, resulting in a stele of an oblong (or elliptic) shape with but three bundles (FIG. 5). This is the usual type in the subsections *Crispi* and *Lucentes*. The final reduction to the one-bundled-type (FIG. 6) is not met with in the broad-leaved species, but is found in the hybrid *P. Berchtoldi* × *perfoliatus* var. *bupleuroides*.

The cells of the endodermis give an important set of diagnostic characters. Although several types can be recognized, these have been grouped in the present treatment into two principal types, according to the type of incrassation of the cell-walls. Cells which are thickened evenly or not at all are called O-cells; those which are much thickened on the inner and lateral faces but remain thin on the face next to the cortex are called U-cells. This latter type of endodermis is always found in the *Natantes*,

Lucentes, and *Praelongi*. All the others here treated have O-cells.

The bundles of the cortex give exceptionally good sets of characters. The cortex of a *Potamogeton* stem is highly lacunate. At the junctures of the walls separating these lacunae may, in some species, be found bundles composed of vascular tissue and fibers or merely of fibers alone. These are called interlacunar bundles and are well developed in the *Natantes*, *Lucentes*, *Praelongi*, and in *P. amplifolius* of the *Amplifolii*. The other subsections are devoid of them, or rarely have one or two weakly developed.

The cortical bundles found directly underneath the epidermis are called subepidermal bundles. They are seldom as strongly developed as the interlacunar bundles, yet they furnish a set of characters which is quite useful. The subepidermal bundles are present in the *Colorati*, *Natantes*, *Praelongi*, and usually in the *Lucentes*, but absent in the other subsections.

The last set of characters used is the presence or absence of a layer or layers of cells directly beneath and adjacent to the epidermis. This is called the pseudo-hypodermis. It is always present in the *Crispi*, *Amplifolii*, *Praelongi*, and *Perfoliati*, but is not present in the *Alpini* and *Nodosi*, whereas the *Colorati*, *Natantes*, and *Lucentes* may or may not have it.

A number of methods of preparing a section of stem for anatomical examination may be used. The following procedure has been found to be simple and rapid and highly satisfactory. When a choice can be made as to the part of the stem to be sectioned it should be at about the middle of the second or third internode below the lowest peduncle. However, any portion of the stem, if not too close to a node, is usually quite satisfactory. The piece of stem is boiled in water for a few minutes to soften and expand the tissues, then dropped into cold water to reduce flabbiness. A clean transverse cut is made near one end with a sharp razor-blade and this end dipped into ordinary blue ink, or other stain, for a second or two. The stem is now rinsed briefly in cold water and rolled on a blotter to remove excess water. With the razor-blade a thin free-hand section is taken off at the stained end, a water-mount made (stained end up), and examined under a microscope. If the stem is badly flattened, it can be

teased out with fine needles. A magnification of about 100 diameters is highly satisfactory, although much lower powers will enable one to determine most of the essential characters. Such mounts need not be thinner than that obtainable by free-hand sectioning, for enough light will come through the lacunae to illuminate the tissues.

The amount of time necessary for making an anatomical examination of a stem need not be greater than that necessary for boiling and dissecting a flower.

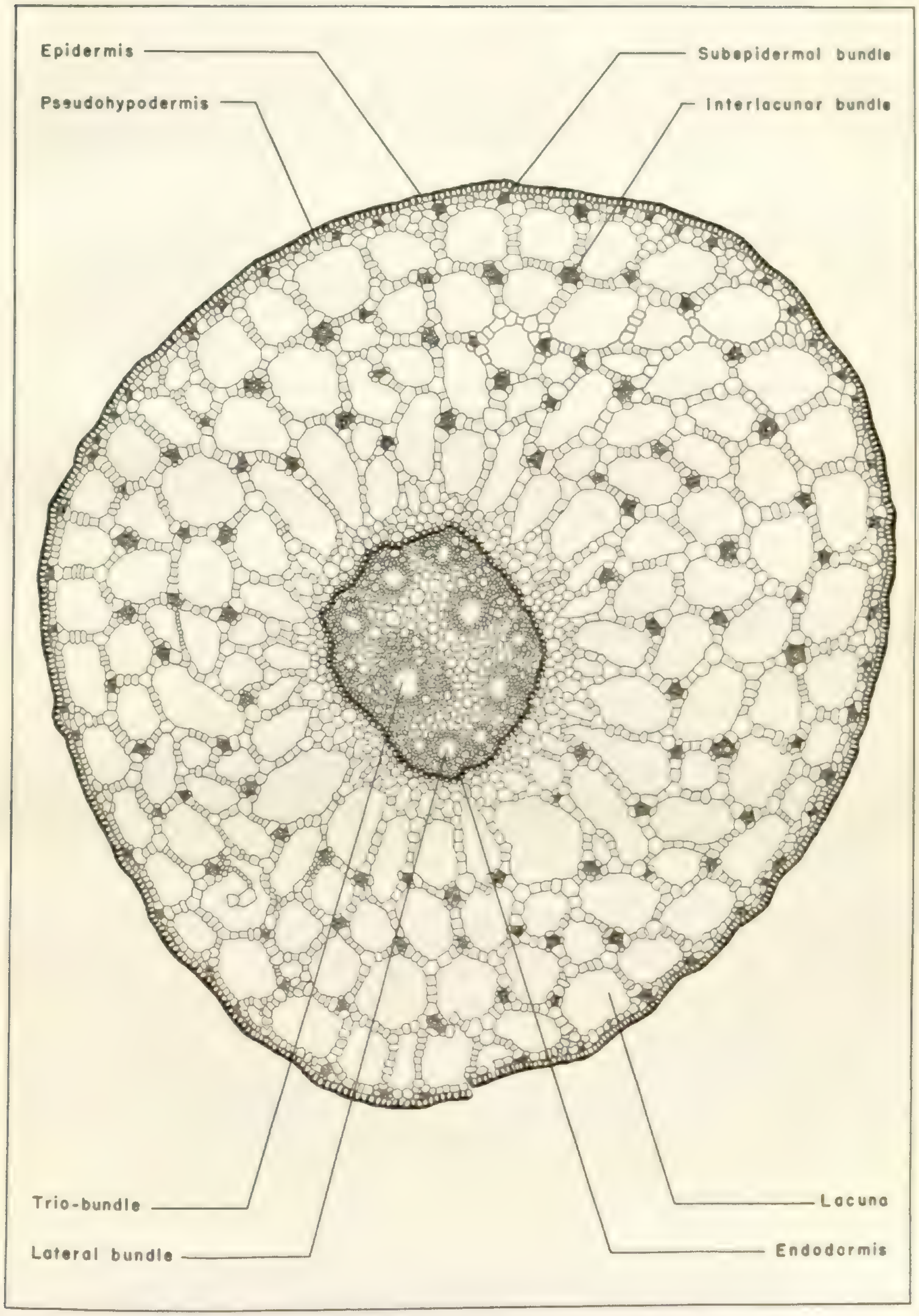
A number of improvements can undoubtedly be made on this method, but mostly at the sacrifice of simplicity and speed. Potassium hydroxide solution is not recommended for swelling the tissues as it destroys the delicate cortex. A weak lactic acid solution will soften tissues quickly and swell them slightly without destroying the cortex, but for most specimens water is more satisfactory. If cold water does not stiffen the material sufficiently for proper sectioning, a few drops of concentrated ammonia in the water are helpful.

Ordinary blue fountain-pen ink is suggested as a stain because it is easily available and has proved very satisfactory. It acts quickly and as a differential stain: coloring the vascular tissue deep blue and the cortical and pith cells light blue; the mechanical tissue (sclerenchyma) usually remaining a bright yellow and the endodermis usually yellow or orange. The clearer results obtained by aniline dyes are not necessary for this work. A two-solution differential stain is not recommended for speedy examination.

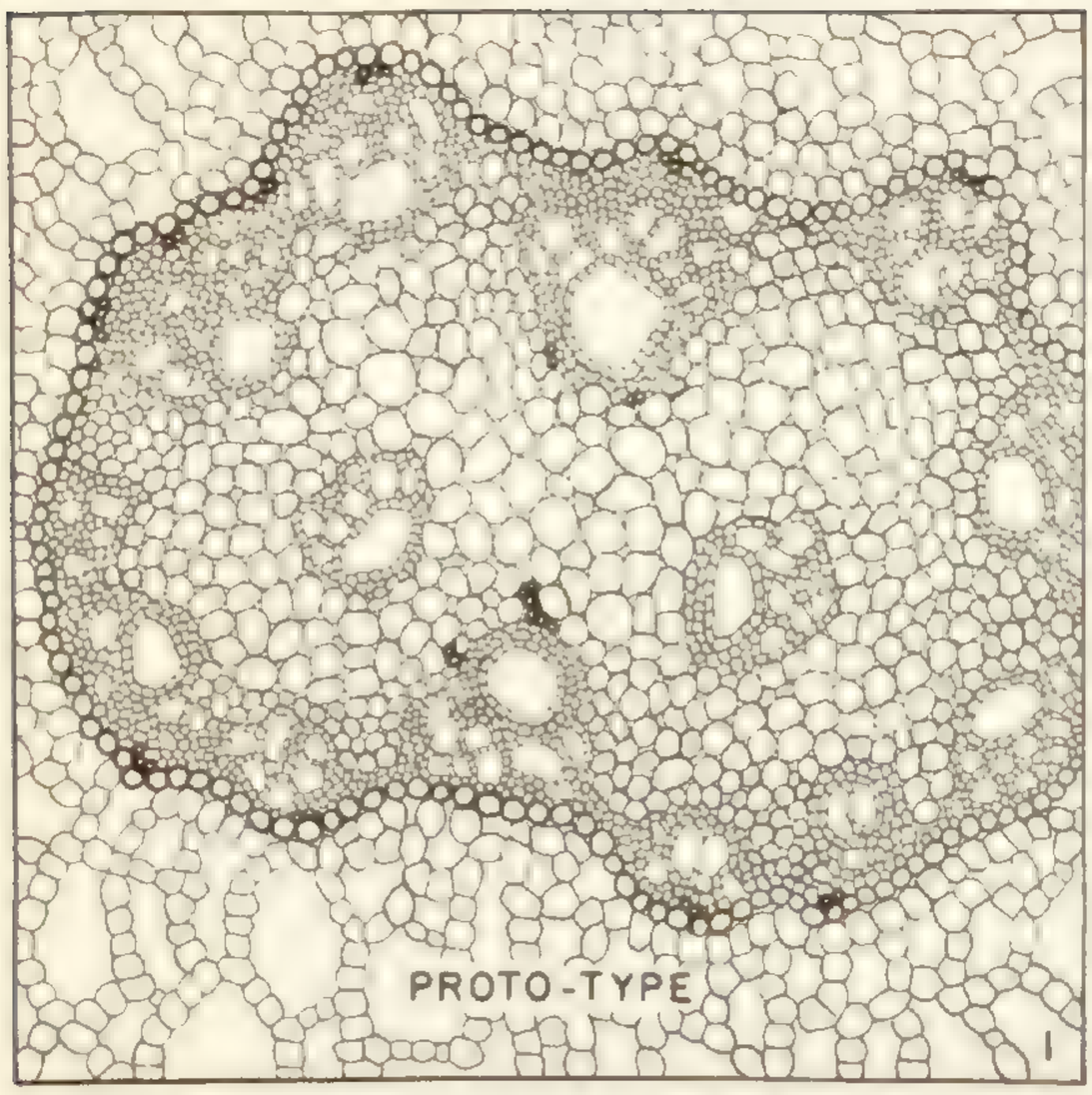
The Classification of North American Pondweeds

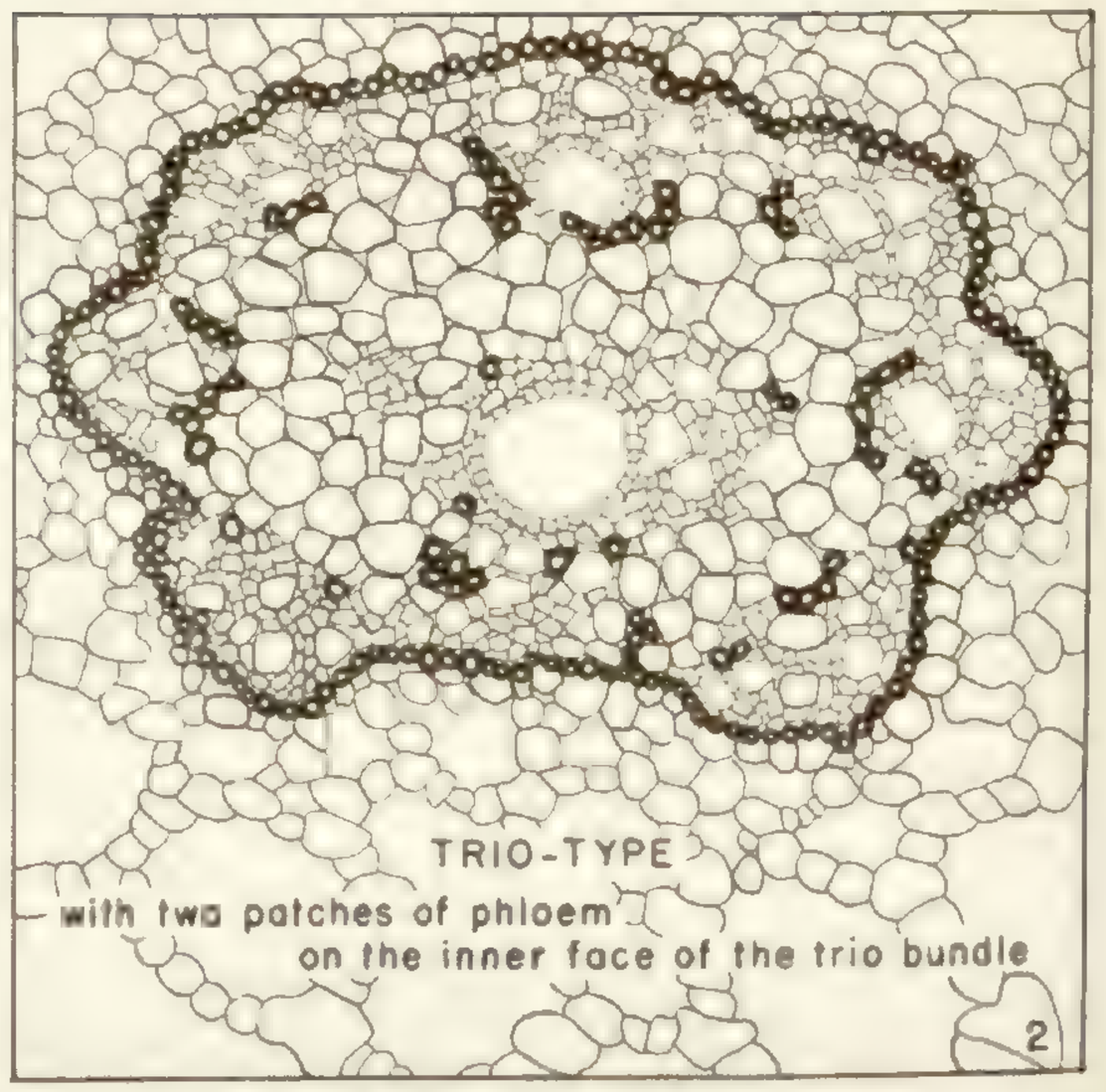
In order that the groups of *Potamogeton* here specially discussed may be properly oriented, an outline (largely following Hagström and Fernald) of the relationships of North American species is here appended. The subsections treated in this paper are indicated by asterisks.

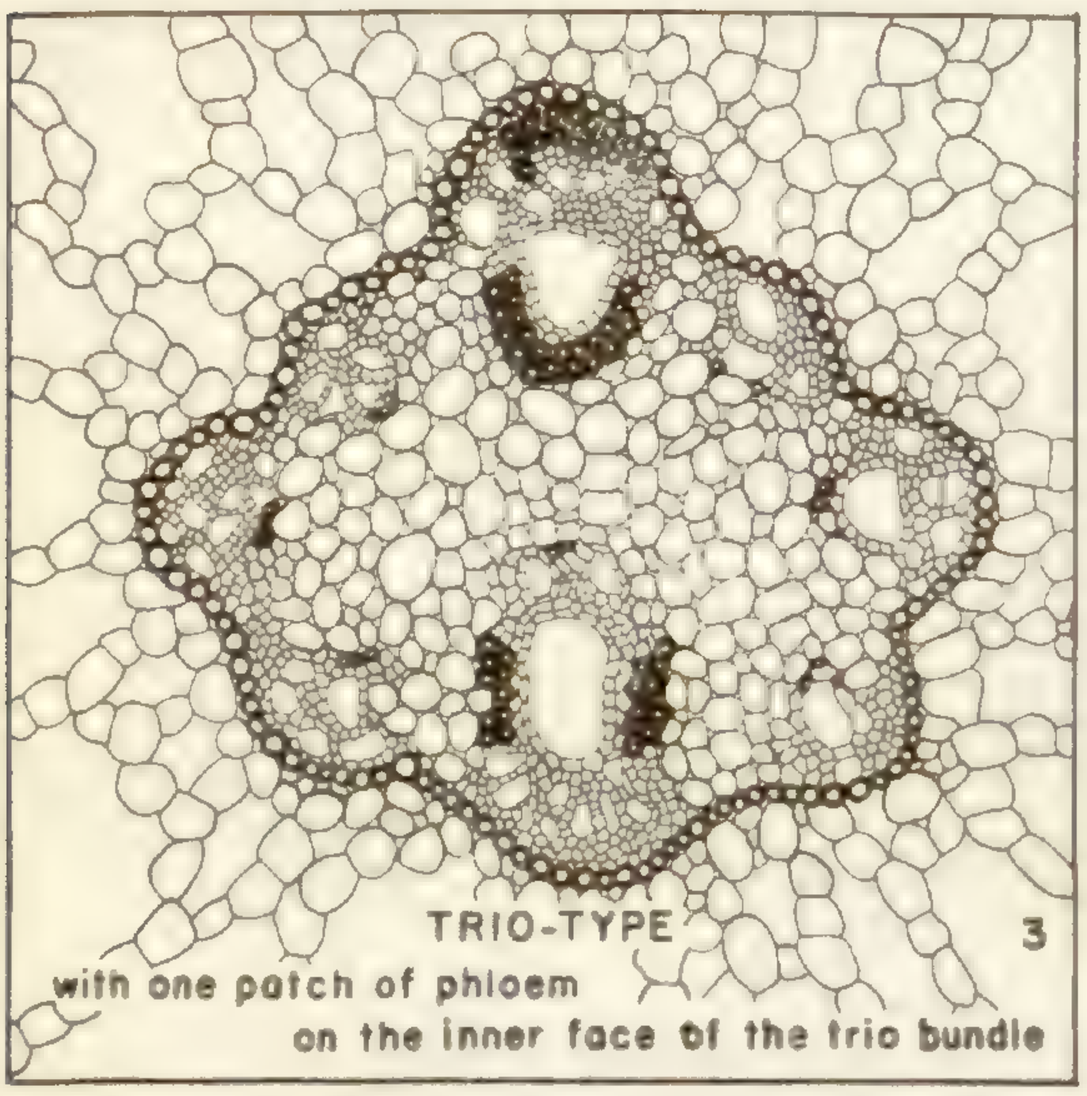
Subgenus Coleogeton (Reichenb.) Raunk.
Section Connati Hagstr.
Subsect. Filiformes Hagstr. (*P. filiformis* Pers., *P. latifolius* (Robbins) Morong).

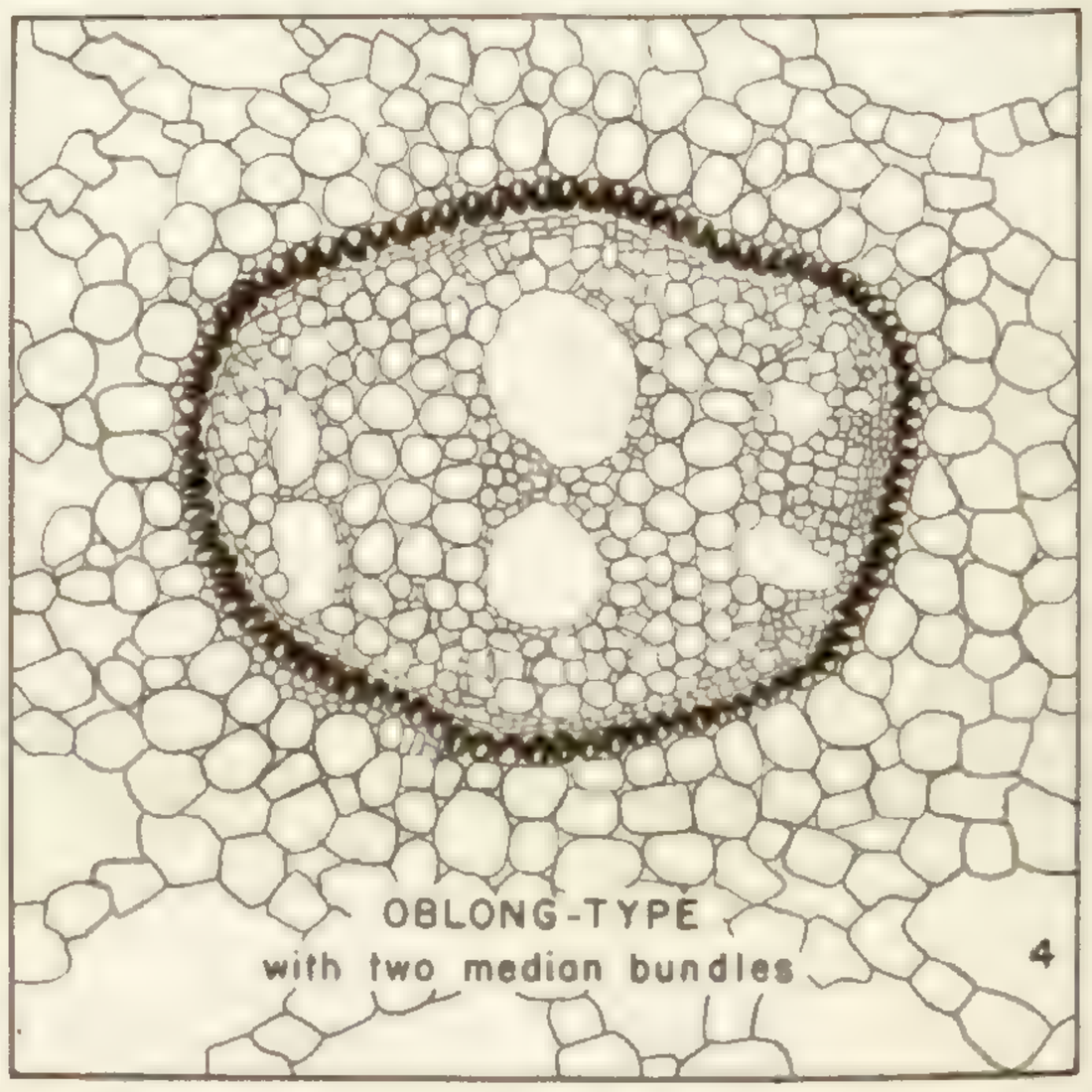


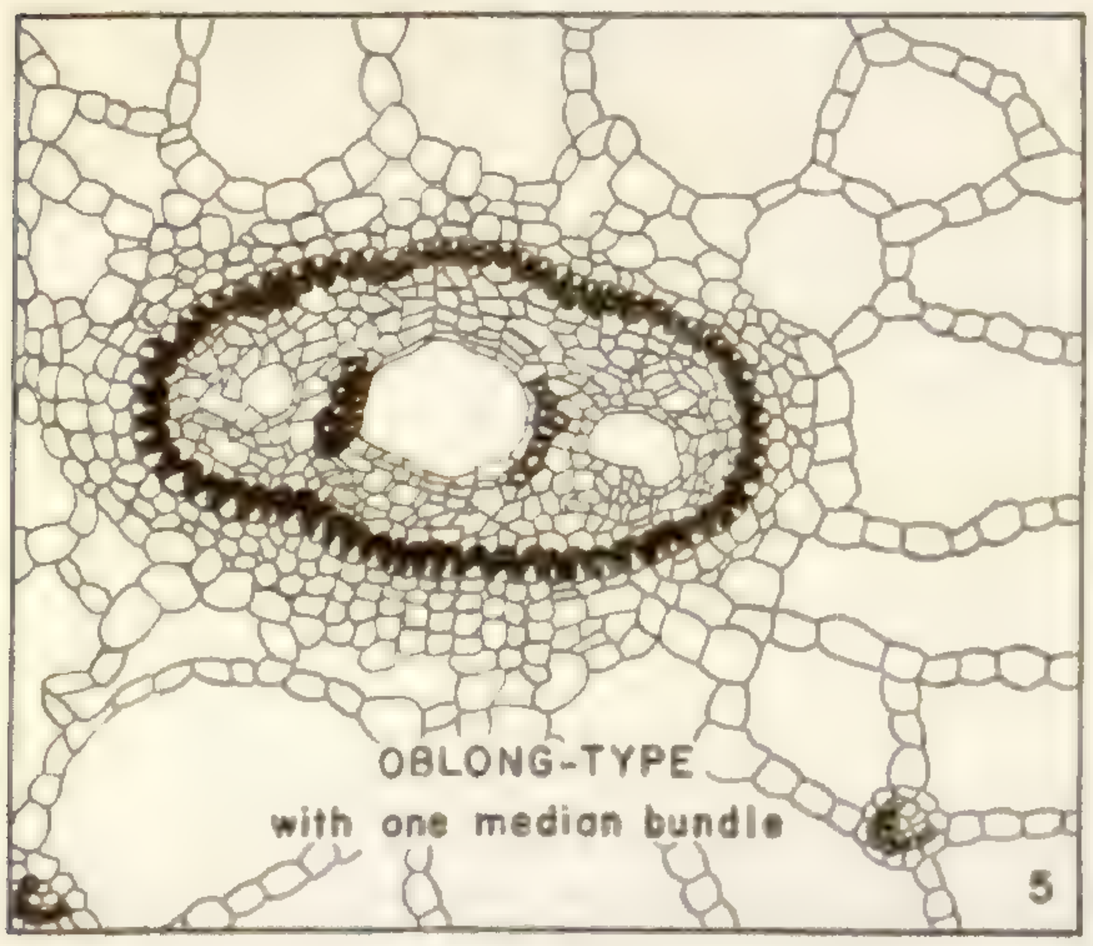
POTAMOGETON NATANS: CROSS-SECTION OF STEM, × 35

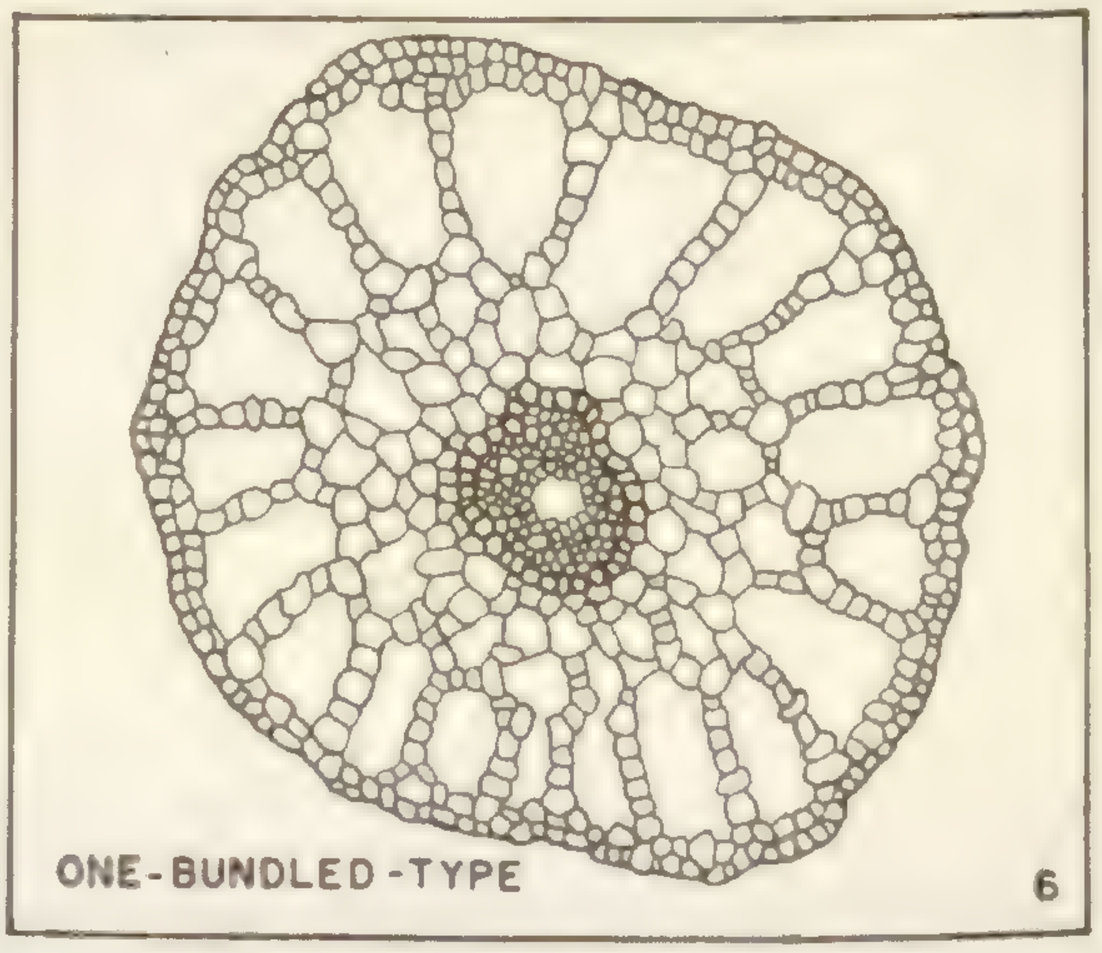












CAMERA-LUCIDA DRAWINGS (cell-contents not shown) FROM STEMS OF POTAMOGETON SHOWING TYPES OF STELES.

Section Convoluti Hagstr.
Subsect. Vaginati Hagstr. (*P. vaginatus* Turcz.).
Subsect. Pectinati (Fries) Hagstr. (*P. pectinatus* L.).
Subgenus Eupotamogeton Raunk.
Section Adnati Hagstr.
Subsect. Serrulati Hagstr. (*P. Robbinsii* Oakes).
Section Axillares Hagstr.
*Subsect. Crispi Wallm. (*P. crispus* L.).
Subsect. Monticoli Hagstr. (*P. confervoides* Reichenb.).
Subsect. Compressi (Fries) Hagstr. (*P. zosteriformis* Fern.).
Subsect. Oxyphylli Hagstr. (*P. Porsildiorum* Fern., perhaps also *P. longiligulatus* Fern.).
Subsect. Pusilli (Graebn.) Hagstr.
Series Pusilli connati Hagstr.
Subseries Foliosi Fern. (*P. foliosus* Raf., *P. fibrillosus* Fern.).
Subseries Panormitani Fern. (*P. Friesii* Rupr., *P. strictifolius* Ar. Benn., *P. pusillus* L.).
Series Pusilli convoluti Hagstr.
Subseries Acuti Hagstr. (*P. gemmiparus* Robbins, *P. Hillii* Morong; *P. longiligulatus* Fern., an atypical species, may belong in the *Oxyphylli*).
Subseries Obtusi Hagstr. (*P. Porteri* Fern., *P. obtusifolius* Mert. & Koch, *P. clystocarpus* Fern., *P. Berchtoldi* Fieber).
Subsect. Javanici Graebn. (*P. Vaseyi* Robbins, *P. lateralis* Morong).
Subsect. Hybridi (Graebn.) Hagstr., in part; *i. e.*
Series Euhybridi Hagstr. (*P. Spirillus* Tuckerm., *P. diversifolius* Raf., *P. capillaceus* Poir., *P. bicupulatus* Fern.).
Subsect. Nuttalliani (Hagstr.) Fern. (*P. epihydrus* Raf., *P. tennesseensis* Fern.).
*Subsect. Alpini (Graebn.) Hagstr. (*P. alpinus* Balbis).
*Subsect. Colorati (Graebn.) Hagstr. (*P. polygonifolius* Pourr.).
*Subsect. Amplifolii Hagstr. (*P. amplifolius* Tuckerm., *P. pulcher* Tuckerm.).
*Subsect. Nodosi Hagstr. (*P. nodosus* Poir.).
*Subsect. Natantes Graebn. (*P. natans* L., *P. Oakesianus* Robbins).
*Subsect. Lucentes Graebn. (*P. gramineus* L., *P. illinoensis* Morong).
*Subsect. Praelongi Hagstr. (*P. praelongus* Wulfen).
*Subsect. Perfoliati (Graebn.) Hagstr. (*P. Richardsonii* (Benn.) Rydb., *P. perfoliatus* L.).

KEY TO THE BROAD-LEAVED NORTH AMERICAN SPECIES OF POTAMOGETON

1. Stem laterally compressed; leaves all submersed, margins toothed; stipules slightly adnate to base of leaf; fruits with beak 2–3 mm. long; winter buds hard and horny; stele of the oblong-type pattern; endodermis of O-cells; interlacunar bundles absent.[1] (subsect. CRISPI) ..... 1. *P. crispus.*

1. Stem terete; leaf-margins entire or minutely denticulate; stipules completely free from leaf-base; fruits with beak not more than 1 mm. long; winter buds rare, not hard and horny; stele with the pattern various in type; if of the oblong-type, then endodermis of U-cells and interlacunar bundles present....2.

2. Submersed leaves petioled or tapering to a sessile base, scarcely clasping; floating leaves present or absent....3.

3. Submersed leaves sessile; floating leaves (usually absent) delicate, translucent, tapering without sharp distinction into the petiole; fruits with exocarp hard and smooth, tawny-olive (subsect. ALPINI) ..... 2. *P. alpinus.*

3. Submersed leaves sessile or petioled; floating leaves coriaceous, opaque, cordate to cuneate at base, blade distinct from petiole; fruits with exocarp soft and porous, greenish, brownish, or reddish....4.

4. Sepaloid connectives 1–2 mm. wide; fruiting spikes 5–7 mm. thick; fruits 1.6–2.5 mm. long, keels rounded or none, beak obsolete or nearly so, endocarp loop usually with a cavity; interlacunar bundles absent; subepidermal bundles present; eastern Newfoundland and Sable Island, Nova Scotia (subsect. COLORATI) ..... 3. *P. polygonifolius.*

4. Sepaloid connectives mostly 1.2–3 mm. wide; fruiting spikes 6–15 mm. thick; fruits mostly 2–5 mm. long, keels variable, beak evident, endocarp loop solid; interlacunar bundles absent or present; if absent, then subepidermal bundles absent; widespread....5.

5. Submersed leaves broadly linear, lanceolate, or ovate, less than 30 times as long as broad, nerves 3–37; stele with the pattern various in type; if of the trio-type, then with but 1 patch of phloem on the inner face of the trio-bundle....6.

6. Submersed leaves with 11–37 nerves, margins strictly entire; floating leaves cordate to rounded at base, nerves mostly more than 21; stele with the proto-type pattern; endodermis of O-cells (subsect. AMPLIFOLII)....7.

7. Stem not conspicuously black-spotted; submersed leaves usually arcuate, 2.5–7.5 cm. wide; floating leaves cuneate or rounded at base, mostly with more than 30 nerves, about ¼ of the nerves more prominent than the rest as seen by transmitted light; peduncles often clavate; fruits cuneate at base, 3.5–4.5 (–5) mm. long; interlacunar bundles present ..... 4. *P. amplifolius.*

7. Stem usually conspicuously black-spotted; submersed leaves not arcuate, 1–2.5 cm. wide;

[1] Anatomical characters refer to those of the stem. See p. 67 and keys on pages 75 and 77–85.

floating leaves cordate or rounded at base, mostly with less than 30 nerves, all nerves of about equal prominence as seen by transmitted light; peduncles not conspicuously clavate; fruits rounded or lobed at base, 3–3.5 (–4) mm. long; interlacunar bundles absent ..... 5. *P. pulcher.*

6. Submersed leaves with 3–29 nerves, margins with fugacious one-celled translucent denticles; floating leaves cuneate to rounded at base, their nerves mostly less than 21; stele with the pattern various in type; if of the proto-type pattern, then endodermis of U-cells....8.

8. Submersed leaves with petioles 2–13 cm. long, apex acutish but not sharp-pointed nor mucronate; fruits 3.5–4 mm. long, usually reddish, keels mostly muricate; endodermis of O-cells; interlacunar bundles absent (subsect. Nodosi) ..... 6. *P. nodosus.*

8. Submersed leaves sessile or with petioles up to 4 cm. long, apex acutish or sharp-pointed, often somewhat mucronate; fruits 1.7–3.5 mm. long, usually greenish, keels scarcely muricate; endodermis of U-cells; interlacunar bundles present (subsect. Lucentes)....9.

9. Stem usually much branched, .5–1 mm. in diameter; submersed leaves .2–1 (–1.5) cm. wide, (5–) 7–12 (–30) times as long as wide, sessile, nerves mostly 3–9; floating leaves 1.5–5 (–7) cm. long, 1–2 (–3) cm. wide, petioles mostly longer than the blades; stipules .5–3 cm. long, .1–.2 mm. wide, keels faint; peduncles clavate or not; fruiting spikes 1–2.5 cm. long, .6–.8 cm. thick; sepaloid connectives mostly 1.2–1.6 mm. wide; fruits 1.7–2.5 (–2.8) cm. long, 1.6–2 (–2.3) cm. wide; stele of the oblong-type pattern with 1 (rarely with 2) central bundles and 1 lateral bundle on each side; interlacunar bundles only in the outer interlacunar circle..... 9. *P. gramineus.*

9. Stem simple or once branched, (1–) 1.5–5 mm. in diameter; submersed leaves 1.5–4 cm. wide, mostly 3–5 times as long as wide, sessile or petiolate, nerves mostly 9–17; floating leaves 4–13 cm. long, 2–6.5 cm. wide, petioles mostly shorter than the blades; stipules (1–) 2.5–8 cm. long, (.3–) .5–1.2 mm. wide, keels prominent; peduncles not clavate; fruiting spikes (2.5–) 3–6 cm. long, .8–1 cm. thick; sepaloid connectives mostly 1.6–3 mm. wide; fruits (2.5–) 2.7–3.5 cm. long, (2.1–) 2.2–3 cm. wide; stele with the pattern various in type; interlacunar bundles in the outer interlacunar circle or sometimes also in the other interlacunar circles..... 10. *P. illinoensis.*

5. Submersed leaves narrowly linear, less than 3 mm.

wide and more than 50 times as long as broad, nerves 1–5; stele of the trio-type pattern with 2 patches of phloem on the inner face of the trio-bundle (subsect. Natantes) . . . . 10.

10. Stem .8–2 mm. in diameter; submersed leaves .8–2 mm. wide; floating leaf-blades 4–9 cm. long, 2.5–6 cm. wide, usually cordate at base, on petioles 1–2.5 mm. thick; stipules 4.5–11 cm. long, strongly keeled; peduncles as thick as the stem; sepaloid connectives mostly 1.8–2.2 mm. wide; fruiting spikes .9–1.2 cm. thick; mature fruits mostly 3.5–5 mm. long, 2.5–3.5 mm. wide, keels scarcely developed, endocarp usually pitted on the sides, apex of seed pointing toward the basal end; stele with 3–5 lateral bundles on each side; interlacunar bundles strongly developed in more than 1 interlacunar circle; pseudo-hypodermis present; epidermal cells 1.5–3 (–4) times as long as broad . . . . . 7. *P. natans.*

10. Stem .5–1 mm. in diameter; submersed leaves .25–1 mm. wide; floating leaf-blades 1.5–5.5 cm. long, 1–3 cm. wide, rounded or cuneate at base, on petioles .2–1 mm. thick; stipules 1–5.5 cm. long, keels prominent only at base; peduncles thicker than the stem; sepaloid connectives mostly 1.3–1.8 mm. wide; fruiting spikes .7–.9 cm. thick; mature fruits mostly 2.5–3.5 mm. long, 2–2.4 mm. wide, keels prominent, endocarp sometimes depressed on the sides but not pitted, apex of seed pointing a little above the basal end; stele with 2–3 lateral bundles on each side; interlacunar bundles strongly developed in but 1 interlacunar circle; pseudo-hypodermis usually absent; epidermal cells 4–7 times as long as broad 8. *P. Oakesianus.*

2. Leaves all submersed, cordate or rounded at base, clasping ½ to ¾ the circumference of the stem . . . . 11.

11. Rhizomes spotted with rusty red; leaves ovate-oblong (5–) 10–20 (–25) cm. long, apex often cucullate, margins entire; stipules usually persistent and conspicuous; peduncles (5–) 15–60 cm. long; fruits more than 4 mm. long and more than 3 mm. wide, dorsal keel strongly developed; stele with the proto-type pattern; endodermis of U-cells; interlacunar and subepidermal bundles present (subsect. Praelongi) . . . . . 11. *P. praelongus.*

11. Rhizomes unspotted; leaves orbicular to ovate-lanceolate, seldom ovate-oblong, 1–10 cm. long, apex not cucullate, margin with fugacious, translucent, one-celled denticles; stipules usually inconspicuous or disintegrated to fibers; peduncles 1–25 cm. long; fruits less than 3.5 mm. long and less than 3 mm. wide, dorsal keel weakly developed, or none; stele with the trio-type pattern; endodermis of O-cells; interlacunar and subepidermal bundles absent (subsect. Perfoliati) . . . . 12.

12. Leaves ovate-lanceolate to narrowly lanceolate, 3–10 cm. long, coarsely nerved; stipules coarse, disinte-

grating to persistent whitish fibers; peduncles often clavate, 1.5–25 cm. long; fruiting spikes about 1 cm. thick; fruits (2.5–) 2.7–3.2 (–3.5) mm. long, (2–) 2.3–2.6 (–3) mm. wide; endocarp-loop with a cavity.....12. *P. Richardsonii.*

12. Leaves orbicular to ovate-lanceolate, the principal ones 1–6 cm. long, delicately nerved; stipules delicate, fugacious; peduncles never clavate, 1–9 cm. long; fruiting spikes about .8 cm. thick; fruits (2.3–) 2.5–2.7 (–3) mm. long, (1.7–) 2–2.1 (–2.3) mm. wide; endocarp-loop solid.....13. *P. perfoliatus.*

Key to the Species Based on the Anatomy of the Stem

1. Interlacunar bundles present....2.
   2. Interlacunar bundles strongly developed throughout....3.
      3. Stele of the proto-type pattern....4.
         4. Endodermis of O-cells; subepidermal bundles absent 4. *P. amplifolius.*
         4. Endodermis of U-cells; subepidermal bundles present 11. *P. praelongus.*
      3. Stele of the trio-type pattern, with the phloem on the inner face of the trio-bundle appearing as 2 distinct patches; endodermis of U-cells; subepidermal bundles present.....7. *P. natans.*
   2. Interlacunar bundles strongly developed only in the outer interlacunar circle (if present in other interlacunar circles, then few or weakly developed); endodermis of U-cells....5.
5. Stele of the trio-type or proto-type pattern....6.
   6. Stele of the trio-type pattern with the phloem on the inner face of the trio-bundle appearing as 2 distinct patches; epidermal cells 4–7 times as long as broad 8. *P. Oakesianus.*
   6. Stele various in pattern; epidermal cells 1–4 times as long as broad.....10. *P. illinoensis.*
5. Stele of the oblong-type pattern....7.
   7. Stele with 1 (rarely with 2) central bundle and usually but 1 lateral bundle on each side; interlacunar bundles only in the outer interlacunar circle; stem .5–1 mm. in diameter.....9. *P. gramineus.*
   7. Stele with 2 (rarely with 1) central bundles and 2 or 3 lateral bundles on each side; interlacunar bundles in the outer interlacunar circle and sometimes also in the other interlacunar circles; stem (1–) 1.5–2.5 mm. in diameter.....10. *P. illinoensis.*

1. Interlacunar bundles absent; endodermis of O-cells (rarely with a few U-cells)....8.
   8. Stele of the oblong-type pattern; stem laterally compressed.....1. *P. crispus.*
   8. Stele of the trio-type or proto-type pattern; stem terete....9.
      9. Stele with the proto-type pattern....10.
         10. Subepidermal bundles present.....3. *P. polygonifolius.*
         10. Subepidermal bundles absent.....5. *P. pulcher.*
      9. Stele with the trio-type pattern....11.
         11. Stele with the phloem on the inner face of the trio-bundle appearing as 1 patch; pseudo-hypodermis absent.....6. *P. nodosus.*

11. Stele with the phloem on the inner face of the trio-bundle appearing as 2 patches (rarely with but 1)....12.
12. Pseudo-hypodermis present.....12. *P. Richardsonii* and 13. *P. perfoliatus.*
12. Pseudo-hypodermis absent.....2. *P. alpinus.*

Selective Key to the Subsections

The following key is offered as a practical one for determining the subsection to which a specimen belongs. It is based on characters available with sterile and otherwise incomplete specimens. It is selective in that the user may choose the order in which the characters may be applied. This is of decided advantage when certain parts of the specimen are absent or difficult to make out, for the other parts may be sufficient for determining the subsection.

The key is extremely easy to use. Any character may be selected which, if not sufficient to name the subsection, will lead to a number. This number will be found heading a column on one of the following pages. On this page another character is now selected and opposite it in the designated column may be found a symbol or new number. This is continued until a symbol appears, which will designate the proper subsection. At any time the subsections that are still possibilities may be ascertained by reference to page 86. If a specimen traces to zero (0) it may be suspected that a character has been selected incorrectly or the specimen is a hybrid with parents in more than one subsection. The subsection *Crispi* is omitted from this key for it is represented only by the introduced species *P. crispus*, which can easily be distinguished from all our indigenous species of *Potamogeton* by its definitely toothed leaf-margins.

When the subsection is determined, reference to the portion of the general key, on pages 72 to 75, dealing with that subsection should give the name of the species.

The following symbols are used to designate the subsections:

AL *Alpini*	AM *Amplifolii*	NA *Natantes*	PR *Praelongi*
CO *Colorati*	NO *Nodosi*	LU *Lucentes*	PE *Perfoliati*

STEM		
STELE		
Proto-type	CO AM LU PR	18
Trio-type	AL NO NA LU PE	8
Oblong-type		LU
ENDODERMIS		
O-cells	AL CO AM NO PE	11
U-cells	CO NA LU PR	17
INTERLACUNAR BUNDLES		
Present	AM NA LU PR	15
Absent	AL CO AM NO PE	11
SUBEPIDERMAL BUNDLES		
Present	CO NA LU PR	17
Absent	AL AM NO LU PE	10
SUBMERSED LEAVES		
SHAPE		
Orbicular	AM PE	66
Ovate	AM LU PR PE	13
Oblong	AL IL PR	48
Lanceolate	AL CO AM NO LU PR PE	2
Oblanceolate or elliptic	AL AM LU	55
Linear	NO NA LU	33
BASE		
Clasping	AL PR PE	46
Not clasping	AL CO AM NO NA LU	5
APEX		
Rounded	AL NA PR PE	20
Acutish	AL CO AM NO LU PE	4
Sharp-pointed	AM NO LU	40
Mucronate	AM LU	68
PETIOLE		
Present	CO AM NO LU	19
Absent	AL AM NA LU PR PE	3
MARGIN		
Entire	AL CO AM NO NA LU PR PE	1
Denticulate	NO LU PE	32
NERVES		
1–5	AL NO NA LU PE	8
6–11	AL CO AM NO LU PE	4
12–21	AM NO LU PR PE	6
22–	AM PR PE	34
STIPULES		
Intact and well developed	AL CO AM NO NA LU PR PE	1
Disintegrated to fibers	AM NA PR PE	14
Delicate or fugacious	AL AM PR PE	24
FLOATING LEAVES		
BASE		
Cordate	CO AM NA	44
Rounded or cuneate	CO AM NO NA LU	7
Tapering		AL
NERVES		
1–10	AL NO NA	53
11–23	AL CO AM NO NA LU	5
24–	AM NA LU	38

STEM	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
STELE										
Proto-type	18	18	36	43	43	36	43	LU	36	68
Trio-type	8	22	21	22	23	32	33	8	47	22
Oblong-type	LU	LU	LU	LU	LU	LU	LU	LU	LU	LU
ENDODERMIS										
O-cells	11	11	54	78	29	39	45	51	54	27
U-cells	17	41	31	71	42	59	42	62	59	LU
INTERLACUNAR B.										
Present	15	36	15	68	38	36	38	62	36	68
Absent	11	11	54	11	29	39	45	51	54	27
SUBEPIDERMAL B.										
Present	17	41	31	71	42	59	42	62	59	LU
Absent	10	10	25	10	28	16	40	22	25	10
SUBMERSED LEAVES										
SHAPE										
Orbicular	66	66	66	66	AM	66	AM	PE	66	66
Ovate	13	13	13	35	68	13	68	58	13	35
Oblong	48	48	48	76	76	59	LU	76	48	76
Lanceolate	2	2	9	4	12	6	19	22	9	10
Oblanc. or ell.	55	55	55	55	55	68	68	76	55	55
Linear	33	64	62	64	33	64	33	33	LU	64
BASE										
Clasping	46	46	46	74	AL	57	0	74	46	74
Not clasping	5	12	26	12	5	40	7	23	55	28
APEX										
Rounded	20	46	20	74	77	57	NA	49	46	74
Acutish	4	4	25	4	12	16	19	22	25	10
Sharp-pointed	40	40	68	40	40	40	40	64	68	40
Mucronate	68	68	68	68	68	68	68	LU	68	68
PETIOLE										
Present	19	19	68	19	19	40	19	64	68	40
Absent	3	9	3	25	26	13	38	21	9	25
MARGIN										
Entire	1	2	3	4	5	6	7	8	9	10
Denticulate	32	32	58	16	64	32	64	32	58	32
NERVES										
1–5	8	22	21	22	23	32	33	8	47	22
6–11	4	4	25	4	12	16	19	22	25	10
12–21	6	6	13	16	40	6	40	32	13	16
22–	34	34	34	66	AM	34	AM	PE	34	66
STIPULES										
Intact	1	2	3	4	5	6	7	8	9	10
Fibers	14	34	14	66	69	34	69	60	34	66
Del. or fug.	24	24	24	54	79	34	AM	74	24	54
FLOATING LEAVES										
BASE										
Cordate	44	73	69	73	44	AM	44	NA	AM	AM
Round. or cun.	7	19	38	19	7	40	7	33	68	40
Tapering	AL	AL	AL	AL	AL	0	0	AL	AL	AL
NERVES										
1–10	53	78	77	78	53	NO	65	53	AL	78
11–23	5	12	26	12	5	40	7	23	55	28
24–	38	68	38	68	38	68	38	62	68	68

STEM	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
STELE										
Proto-type	73	43	36	67	36	68	41	18	43	PR
Trio-type	51	52	58	60	62	32	62	LU	64	49
Oblong-type	0	LU	LU	0	LU	LU	LU	LU	LU	0
ENDODERMIS										
O-cells	11	29	66	66	AM	39	CO	73	45	74
U-cells	CO	71	59	61	31	LU	17	41	71	61
INTERLACUNAR B.										
Present	AM	68	36	37	15	68	31	36	68	61
Absent	11	29	66	66	AM	39	CO	73	45	74
SUBEPIDERMAL B.										
Present	CO	71	59	61	31	LU	17	41	71	61
Absent	27	28	35	66	68	16	LU	68	40	74
SUBMERSED LEAVES										
SHAPE										
Orbicular	66	AM	66	66	AM	66	0	AM	AM	PE
Ovate	66	68	13	34	36	35	59	36	68	57
Oblong	AL	76	59	PR	59	LU	59	59	LU	75
Lanceolate	11	12	13	34	36	16	41	18	19	46
Oblanc. or ell	79	55	68	AM	68	68	LU	68	68	AL
Linear	NO	64	LU	NA	62	64	62	LU	64	NA
BASE										
Clasping	74	AL	57	57	PR	PE	PR	PR	0	46
Not clasping	29	12	68	69	38	40	42	43	19	77
APEX										
Rounded	74	AL	57	30	61	PE	61	PR	0	20
Acutish	11	12	35	66	68	16	71	43	19	74
Sharp-pointed	70	40	68	AM	68	40	LU	68	40	0
Mucronate	AM	68	68	AM	68	68	LU	68	68	0
PETIOLE										
Present	45	19	68	AM	68	40	71	43	19	0
Absent	54	55	13	14	15	35	31	36	68	20
MARGIN										
Entire	11	12	13	14	15	16	17	18	19	20
Denticulate	63	64	58	PE	LU	32	LU	LU	64	PE
NERVES										
1–5	51	52	58	60	62	32	62	LU	64	49
6–11	11	12	35	66	68	16	71	43	19	74
12–21	39	40	13	34	36	16	59	36	40	57
22–	66	AM	34	34	67	66	PR	67	AM	57
STIPULES										
Intact	11	12	13	14	15	16	17	18	19	20
Fibers	66	AM	34	14	37	66	61	67	AM	30
Del. or fug.	54	79	34	34	67	66	PR	67	AM	46
FLOATING LEAVES										
BASE										
Cordate	73	73	AM	69	69	AM	72	73	73	NA
Round. or cun.	45	19	68	69	38	40	42	43	19	NA
Tapering	AL	AL	0	0	0	0	0	0	0	AL
NERVES										
1–10	78	78	0	NA	NA	NO	NA	0	NO	77
11–23	29	12	68	69	38	40	42	43	19	77
24–	AM	68	68	69	38	68	62	68	68	NA

STEM	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
Stele										
Proto-type	LU	LU	LU	67	68	68	AM	68	73	PR
Trio-type	21	22	23	74	47	50	51	52	78	60
Oblong-type	LU	LU	LU	0	LU	LU	0	LU	0	0
Endodermis										
O-cells	74	51	78	54	54	79	27	56	29	PE
U-cells	62	LU	62	PR	LU	62	0	LU	CO	61
Interlacunar B.										
Present	62	LU	62	67	68	38	AM	68	AM	61
Absent	74	51	78	54	54	79	27	56	29	PE
Subepidermal B.										
Present	62	LU	62	PR	LU	62	0	LU	CO	61
Absent	47	22	52	54	93	55	27	28	56	PE
SUBMERSED LEAVES										
Shape										
Orbicular	PE	PE	0	66	66	AM	66	AM	AM	PE
Ovate	58	58	LU	34	35	68	66	68	AM	57
Oblong	76	76	76	75	76	76	AL	76	AL	PR
Lanceolate	47	22	52	24	25	55	27	28	29	57
Oblanc. or ell.	76	76	76	79	55	55	79	55	79	0
Linear	62	64	33	0	LU	62	NO	64	NO	NA
Base										
Clasping	74	74	AL	46	74	AL	74	AL	AL	57
Not clasping	50	52	23	79	55	26	56	28	29	NA
Apex										
Rounded	49	74	77	46	74	77	74	AL	AL	30
Acutish	47	22	52	54	25	55	27	28	29	PE
Sharp-pointed	LU	64	64	AM	68	68	70	40	70	0
Mucronate	LU	LU	LU	AM	68	68	AM	68	AM	0
Petiole										
Present	LU	64	64	AM	68	68	70	40	45	0
Absent	21	47	50	24	25	26	54	55	79	30
Margin										
Entire	21	22	23	24	25	26	27	28	29	30
Denticulate	58	32	64	PE	58	LU	63	64	NO	PE
Nerves										
1–5	21	22	23	74	47	50	51	52	78	60
6–11	47	22	52	54	25	55	27	28	29	PE
12–21	58	32	64	34	35	68	39	40	70	57
22–	PE	PE	0	34	66	AM	66	AM	AM	57
STIPULES										
Intact	21	22	23	24	25	26	27	28	29	30
Fibers	60	PE	NA	34	66	69	66	AM	AM	30
Del. or fug.	74	74	AL	24	54	79	54	79	79	57
FLOATING LEAVES										
Base										
Cordate	NA	0	NA	AM	AM	69	AM	AM	73	NA
Round. or cun.	62	64	33	AM	68	38	70	40	45	NA
Tapering	AL	AL	AL	AL	AL	AL	AL	AL	AL	0
Nerves										
1–10	77	78	53	AL	AL	77	78	78	78	NA
11–23	50	52	23	79	55	26	56	28	29	NA
24–	62	LU	62	AM	68	38	AM	68	AM	NA

STEM	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*
STELE										
Proto-type	59	LU	LU	67	68	36	67	68	AM	68
Trio-type	62	32	33	PE	58	LU	NA	62	63	64
Oblong-type	LU	LU	LU	0	LU	LU	0	LU	0	LU
ENDODERMIS										
O-cells	0	63	NO	66	66	AM	AM	AM	39	70
U-cells	31	LU	62	PR	LU	59	61	62	0	LU
INTERLACUNAR B.										
Present	31	LU	62	67	68	36	37	38	AM	68
Absent	0	63	NO	66	66	AM	AM	AM	39	70
SUBEPIDERMAL B.										
Present	31	LU	62	PR	LU	59	61	62	0	LU
Absent	LU	32	64	66	35	68	AM	68	39	40
SUBMERSED LEAVES										
SHAPE										
Orbicular	0	PE	0	66	66	AM	AM	AM	66	AM
Ovate	59	58	LU	34	35	36	67	68	66	68
Oblong	59	LU	LU	PR	LU	59	PR	LU	0	LU
Lanceolate	59	32	64	34	35	36	67	68	39	40
Oblanc. or ell.	LU	LU	LU	AM	68	68	AM	68	AM	68
Linear	62	64	33	0	LU	LU	NA	62	NO	64
BASE										
Clasping	PR	PE	0	57	PE	PR	PR	0	PE	0
Not clasping	62	64	33	AM	68	68	69	38	70	40
APEX										
Rounded	61	PE	NA	57	PE	PR	61	NA	PE	0
Acutish	LU	32	64	66	35	68	AM	68	39	40
Sharp-pointed	LU	64	64	AM	68	68	AM	68	70	40
Mucronate	LU	LU	LU	AM	68	68	AM	68	AM	68
PETIOLE										
Present	LU	64	64	AM	68	68	AM	68	70	40
Absent	31	58	62	34	35	36	37	38	66	68
MARGIN										
Entire	31	32	33	34	35	36	37	38	39	40
Denticulate	LU	32	64	PE	58	LU	0	LU	63	64
NERVES										
1–5	62	32	33	PE	58	LU	NA	62	63	64
6–11	LU	32	64	66	35	68	AM	68	39	40
12–21	59	32	64	34	35	36	67	68	39	40
22–	PR	PE	0	34	66	67	67	AM	66	AM
STIPULES										
Intact	31	32	33	34	35	36	37	38	39	40
Fibers	61	PE	NA	34	66	67	37	69	66	AM
Del. or fug.	PR	PE	0	34	66	67	67	AM	66	AM
FLOATING LEAVES										
BASE										
Cordate	NA	0	NA	AM	AM	AM	69	69	AM	AM
Round. or cun.	62	64	33	AM	68	68	69	38	70	40
Tapering	0	0	0	0	0	0	0	0	0	0
NERVES										
1–10	NA	NO	65	0	0	0	NA	NA	NO	NO
11–23	62	64	33	AM	68	68	69	38	70	40
24–	62	LU	62	AM	68	68	69	38	AM	68

STEM	*41*	*42*	*43*	*44*	*45*	*46*	*47*	*48*	*49*	*50*
Stele										
Proto-type	41	71	43	73	73	PR	LU	59	0	LU
Trio-type	LU	62	LU	NA	NO	74	47	76	49	50
Oblong-type	LU	LU	LU	0	0	0	LU	LU	0	LU
Endodermis										
O-cells	CO	CO	73	73	45	74	74	AL	74	AL
U-cells	41	42	71	72	CO	PR	LU	59	NA	62
Interlacunar B.										
Present	59	62	68	69	AM	PR	LU	59	NA	62
Absent	CO	CO	73	73	45	74	74	AL	74	AL
Subepidermal B.										
Present	41	42	71	72	CO	PR	LU	59	NA	62
Absent	LU	LU	68	AM	70	74	47	76	74	76
SUBMERSED LEAVES										
Shape										
Orbicular	0	0	AM	AM	AM	PE	PE	0	PE	0
Ovate	59	LU	68	AM	AM	57	58	59	PE	LU
Oblong	59	LU	LU	0	0	75	76	48	AL	76
Lanceolate	41	71	43	73	45	46	47	48	74	76
Oblanc. or ell.	LU	LU	68	AM	AM	AL	76	76	AL	76
Linear	LU	62	LU	AM	NO	0	LU	LU	NA	62
Base										
Clasping	PR	0	0	0	0	46	74	75	74	AL
Not clasping	71	42	43	44	45	AL	76	76	77	50
Apex										
Rounded	PR	NA	0	NA	0	46	74	75	49	77
Acutish	71	71	43	73	45	74	47	76	74	76
Sharp-pointed	LU	LU	68	AM	70	0	LU	LU	0	LU
Mucronate	LU	LU	68	AM	AM	0	LU	LU	0	LU
Petiole										
Present	71	71	43	73	45	0	LU	LU	0	LU
Absent	59	62	68	69	AM	46	47	48	49	50
Margin										
Entire	41	42	43	44	45	46	47	48	49	50
Denticulate	LU	LU	LU	0	NO	PE	58	LU	PE	LU
Nerves										
1–5	LU	62	LU	NA	NO	74	47	76	49	50
6–11	71	71	43	73	45	74	47	76	74	76
12–21	59	LU	68	AM	70	57	58	59	PE	LU
22–	PR	0	AM	AM	AM	57	PE	PR	PE	0
STIPULES										
Intact	41	42	43	44	45	46	47	48	49	50
Fibers	PR	NA	AM	69	AM	57	PE	PR	60	NA
Del. or fug.	PR	0	AM	AM	AM	46	74	75	74	LU
FLOATING LEAVES										
Base										
Cordate	CO	72	73	14	73	0	0	0	NA	NA
Round. or cun.	41	42	43	44	45	0	LU	LU	NA	62
Tapering	0	0	0	0	0	AL	AL	AL	AL	AL
Nerves										
1–10	0	NA	0	NA	NO	AL	AL	AL	77	77
11–23	71	42	43	44	45	AL	76	76	77	50
24–	LU	62	68	69	AM	0	LU	LU	NA	62

STEM	*51*	*52*	*53*	*54*	*55*	*56*	*57*	*58*	*59*	*60*
STELE										
Proto-type	0	LU	0	AM	68	AM	PR	LU	59	0
Trio-type	51	52	53	74	76	78	PE	58	LU	60
Oblong-type	0	LU	0	0	LU	0	0	LU	LU	0
ENDODERMIS										
O-cells	51	78	78	54	79	56	PE	PE	0	PE
U-cells	0	LU	NA	0	LU	0	PR	LU	59	NA
INTERLACUNAR B.										
Present	0	LU	NA	AM	68	AM	PR	LU	59	NA
Absent	51	78	78	54	79	56	PE	PE	0	PE
SUBEPIDERMAL B.										
Present	0	LU	NA	0	LU	0	PR	LU	59	NA
Absent	51	52	78	54	55	56	PE	58	LU	PE
SUBMERSED LEAVES										
SHAPE										
Orbicular	PE	0	0	66	AM	AM	PE	PE	0	PE
Ovate	PE	LU	0	66	68	AM	57	58	59	PE
Oblong	AL	76	AL	AL	76	AL	PR	LU	59	0
Lanceolate	51	52	78	54	55	56	57	58	59	PE
Oblanc. or ell.	AL	76	AL	79	55	79	0	LU	LU	0
Linear	NO	64	65	0	LU	NO	0	LU	LU	NA
BASE										
Clasping	74	AL	AL	74	AL	AL	57	PE	PR	PE
Not clasping	78	52	53	79	55	56	0	LU	LU	NA
APEX										
Rounded	74	AL	77	74	AL	AL	57	PE	PR	60
Acutish	51	52	78	54	55	56	PE	58	LU	PE
Sharp-pointed	NO	64	NO	AM	68	70	0	LU	LU	0
Mucronate	0	LU	0	AM	68	AM	0	LU	LU	0
PETIOLE										
Present	NO	64	NO	AM	68	70	0	LU	LU	0
Absent	74	76	77	54	55	79	57	58	59	60
MARGIN										
Entire	51	52	53	54	55	56	57	58	59	60
Denticulate	63	64	NO	PE	LU	NO	PE	58	LU	PE
NERVES										
1–5	51	52	53	74	76	78	PE	58	LU	60
6–11	51	52	78	54	55	56	PE	58	LU	PE
12–21	63	64	NO	66	68	70	57	58	59	PE
22–	PE	0	0	66	AM	AM	57	PE	PR	PE
STIPULES										
Intact	51	52	53	54	55	56	57	58	59	60
Fibers	PE	0	NA	AM	AM	AM	57	PE	PR	60
Del. or fug.	74	AL	AL	54	79	79	57	PE	PR	PE
FLOATING LEAVES										
BASE										
Cordate	0	0	NA	66	AM	AM	0	0	0	NA
Round. or cun.	NO	64	65	AM	68	70	0	LU	LU	NA
Tapering	AL	AL	AL	AL	AL	AL	0	0	0	0
NERVES										
1–10	78	78	53	AL	AL	78	0	0	0	NA
11–23	78	52	53	79	55	56	0	LU	LU	NA
24–	0	LU	NA	AM	68	AM	0	LU	LU	NA

STEM	*61*	*62*	*63*	*64*	*65*	*66*	*67*	*68*	*69*	*70*
Stele										
Proto-type	PR	LU	0	LU	0	AM	67	68	AM	AM
Trio-type	NA	62	63	64	65	PE	0	LU	NA	NO
Oblong-type	0	LU	0	LU	0	0	0	LU	0	0
Endodermis										
O-cells	0	0	63	NO	NO	66	AM	AM	AM	70
U-cells	61	62	0	LU	NA	0	PR	LU	NA	0
Interlacunar B.										
Present	61	62	0	LU	NA	AM	67	68	69	AM
Absent	0	0	63	NO	NO	66	AM	AM	AM	70
Subepidermal B.										
Present	61	61	0	LU	NA	0	PR	LU	NA	0
Absent	0	LU	63	64	NO	66	AM	68	AM	70
SUBMERSED LEAVES										
Shape										
Orbicular	0	0	PE	0	0	66	AM	AM	AM	AM
Ovate	PR	LU	PE	LU	0	66	67	68	AM	AM
Oblong	PR	LU	0	LU	0	0	PR	LU	0	0
Lanceolate	PR	LU	63	64	NO	66	67	68	AM	70
Oblanc. or ell.	0	LU	0	LU	0	AM	AM	68	AM	AM
Linear	NA	62	NO	64	65	0	0	LU	NA	NO
Base										
Clasping	PR	0	PE	0	0	PE	PR	0	0	0
Not clasping	NA	62	NO	64	65	AM	AM	68	69	70
Apex										
Rounded	61	NA	PE	0	NA	PE	PR	0	NA	0
Acutish	0	LU	63	64	NO	66	AM	68	AM	70
Sharp-pointed	0	LU	NO	64	NO	AM	AM	68	AM	70
Mucronate	0	LU	0	LU	0	AM	AM	68	AM	AM
Petiole										
Present	0	LU	NO	64	NO	AM	AM	68	AM	70
Absent	61	62	PE	LU	NA	66	67	68	69	AM
Margin										
Entire	61	62	63	64	65	66	67	68	69	70
Denticulate	0	LU	63	64	NO	PE	0	LU	0	NO
Nerves										
1–5	NA	62	63	64	65	PE	0	LU	NA	NO
6–11	0	LU	63	64	NO	66	AM	68	AM	70
12–21	PR	LU	63	64	NO	66	67	68	AM	70
22–	PR	0	PE	0	0	66	67	AM	AM	AM
STIPULES										
Intact	61	62	63	64	65	66	67	68	69	70
Fibers	61	NA	PE	0	NA	66	67	AM	69	AM
Del. or fug.	PR	0	PE	0	0	66	67	AM	AM	AM
FLOATING LEAVES										
Base										
Cordate	NA	NA	0	0	NA	AM	AM	AM	69	AM
Round. or cun.	NA	62	NO	64	65	AM	AM	68	69	70
Tapering	0	0	0	0	0	0	0	0	0	0
Nerves										
1–10	NA	NA	NO	NO	65	0	0	0	NA	NO
11–23	NA	62	NO	64	65	AM	AM	68	69	70
24–	NA	62	0	LU	NA	AM	AM	68	69	AM

STEM	*71*	*72*	*73*	*74*	*75*	*76*	*77*	*78*	*79*
STELE									
Proto-type	71	CO	73	0	PR	LU	0	0	AM
Trio-type	LU	NA	0	74	AL	76	77	78	AL
Oblong-type	LU	0	0	0	0	LU	0	0	0
ENDODERMIS									
O-cells	CO	CO	73	74	AL	AL	AL	78	79
U-cells	71	72	CO	0	PR	LU	NA	0	0
INTERLACUNAR B.									
Present	LU	NA	AM	0	PR	LU	NA	0	AM
Absent	CO	CO	73	74	AL	AL	AL	78	79
SUBEPIDERMAL B.									
Present	71	72	CO	0	PR	LU	NA	0	0
Absent	LU	0	AM	74	AL	76	AL	78	79
SUBMERSED LEAVES									
SHAPE									
Orbicular	0	0	AM	PE	0	0	0	0	AM
Ovate	LU	0	AM	PE	PR	LU	0	0	AM
Oblong	LU	0	0	AL	75	76	AL	AL	AL
Lanceolate	71	CO	73	74	75	76	AL	78	79
Oblanc. or ell.	LU	0	AM	AL	AL	76	AL	AL	79
Linear	LU	NA	0	0	0	LU	NA	NO	0
BASE									
Clasping	0	0	0	74	75	AL	AL	AL	AL
Not clasping	71	72	73	AL	AL	76	77	78	79
APEX									
Rounded	0	NA	0	74	75	AL	77	AL	AL
Acutish	71	CO	73	74	AL	76	AL	78	79
Sharp-pointed	LU	0	AM	0	0	LU	0	NO	AM
Mucronate	LU	0	AM	0	0	LU	0	0	AM
PETIOLE									
Present	71	CO	73	0	0	LU	0	NO	AM
Absent	LU	NA	AM	74	75	76	77	AL	79
MARGIN									
Entire	71	72	73	74	75	76	77	78	79
Denticulate	LU	0	0	PE	0	LU	0	NO	0
NERVES									
1–5	LU	NA	0	74	AL	76	77	78	AL
6–11	71	CO	73	74	AL	76	AL	78	79
12–21	LU	0	AM	PE	PR	LU	0	NO	AM
22–	0	0	AM	PE	PR	0	0	0	AM
STIPULES									
Intact	71	72	73	74	75	76	77	78	79
Fibers	0	NA	AM	PE	PR	0	NA	0	AM
Del. or fug.	0	0	AM	74	75	AL	AL	AL	79
FLOATING LEAVES									
BASE									
Cordate	CO	72	73	0	0	0	NA	0	AM
Round. or cun.	71	72	73	0	0	LU	NA	NO	AM
Tapering	0	0	0	AL	AL	AL	AL	AL	AL
NERVES									
1–10	0	NA	0	AL	AL	AL	77	78	AL
11–23	71	72	73	AL	AL	76	77	78	79
24–	LU	NA	AM	0	0	LU	NA	0	AM

The numbers used in the selective key and the subsections they represent are as follows:

1.	AL	CO	AM	NO	NA	LU	PR	PE
2.	AL	CO	AM	NO	LU	PR	PE	
3.	AL	AM	NA	LU	PR	PE		
4.	AL	CO	AM	NO	LU	PE		
5.	AL	CO	AM	NO	NA	LU		
6.	AM	NO	LU	PR	PE			
7.	CO	AM	NO	NA	LU			
8.	AL	NO	NA	LU	PE			
9.	AL	AM	LU	PR	PE			
10.	AL	AM	NO	LU	PE			
11.	AL	CO	AM	NO	PE			
12.	AL	CO	AM	NO	LU			
13.	AM	LU	PR	PE				
14.	AM	NA	PR	PE				
15.	AM	NA	LU	PR				
16.	AM	NO	LU	PE				
17.	CO	NA	LU	PR				
18.	CO	AM	LU	PR				
19.	CO	AM	NO	LU				
20.	AL	NA	PR	PE				
21.	AL	NA	LU	PE				
22.	AL	NO	LU	PE				
23.	AL	NO	NA	LU				
24.	AL	AM	PR	PE				
25.	AL	AM	LU	PE				
26.	AL	AM	NA	LU				
27.	AL	AM	NO	PE				
28.	AL	AM	NO	LU				
29.	AL	CO	AM	NO				
30.	NA	PR	PE					
31.	NA	LU	PR					
32.	NO	LU	PE					
33.	NO	NA	LU					
34.	AM	PR	PE					
35.	AM	LU	PE					
36.	AM	LU	PR					
37.	AM	NA	PR					
38.	AM	NA	LU					
39.	AM	NO	PE					
40.	AM	NO	LU					
41.	CO	LU	PR					
42.	CO	NA	LU					
43.	CO	AM	LU					
44.	CO	AM	NA					
45.	CO	AM	NO					
46.	AL	PR	PE					
47.	AL	LU	PE					
48.	AL	LU	PR					
49.	AL	NA	PE					
50.	AL	NA	LU					
51.	AL	NO	PE					
52.	AL	NO	LU					
53.	AL	NO	NA					
54.	AL	AM	PE					
55.	AL	AM	LU					
56.	AL	AM	NO					
57.	PR	PE						
58.	LU	PE						
59.	LU	PR						
60.	NA	PE						
61.	NA	PR						
62.	NA	LU						
63.	NO	PE						
64.	NO	LU						
65.	NO	NA						
66.	AM	PE						
67.	AM	PR						
68.	AM	LU						
69.	AM	NA						
70.	AM	NO						
71.	CO	LU						
72.	CO	NA						
73.	CO	AM						
74.	AL	PE						
75.	AL	PR						
76.	AL	LU						
77.	AL	NA						
78.	AL	NO						
79.	AL	AM						

Synopsis of Species

1. P. crispus Linnaeus

Rhizome about same thickness as stem, buff or reddish, unspotted. Stem laterally compressed, simple or branched, .5–2 (2.5) mm. in greatest diameter; stele of the oblong-type pattern with but 1 central bundle and 1 lateral bundle on each side; endodermis of O-cells; interlacunar bundles absent; subepidermal bundles absent; pseudo-hypodermis 1 cell thick. Leaves all submersed, linear-oblong to linear-oblanceolate, principal ones (3–) 5–8 (–10) cm. long, (.2–) .5–.8 (–1) cm. wide, semi-clasping at base, broadly rounded at apex; nerves 3–7; lacunae of 1 or 2

rows along the midrib; margins finely and irregularly dentate. STIPULES .5–1 cm. long, slightly adnate at base, upper part fraying early, leaving the papery or shreddy bases. PEDUNCLES terete, about same thickness as greatest diameter of stem, 2–5 (–7) cm. long. SPIKES in anthesis compact or moniliform, of 3–5 whorls of flowers; in fruit 1–2 cm. long, 1–1.3 cm. thick. Flowers sessile or on pedicels up to .4 mm. long; sepaloid connectives orbicular, (1.2–) 1.5–1.9 (–2.1) mm. wide, claws .3–.9 mm. long; anthers .7–1.1 (–1.3) mm. long. FRUITS ovate, (2–) 2.5–3 (–3.6) mm. long (excluding beak), (1.6–) 2–2.5 (–2.8) mm. wide; keels obtuse but prominent, dorsal one strongly developed below and with a small projecting tooth near the base; beak prominent, straight or incurved, 2–3 mm. long; exocarp rather smooth, greenish or brownish; endocarp loop solid and near the base; apex of seed pointing toward the basal end. WINTER BUDS hard and horny, 1–2 cm. thick.

P. crispus L., Sp. Pl. **1:** 126 (1753); C. & S., Linnaea **2:** 186 (1827); Morong, Mem. Torr. Club **3:** no. 2: 36 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 97 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 21 (1909); Hagstr., Crit. Res. Pot. 58 (1916).

Ponds and streams. Southern Quebec to Virginia, west to Missouri, also in California. MAP 1. Europe, Asia, Africa, Australia. The following are representative: QUEBEC: Ile Sainte-Therèse, St.-Jean Co., *Victorin & Rolland 45189* and *49141*. VERMONT: tributary of Lake Champlain, Charlotte, July 8–11, 1911, *Dutton;* Charlotte, Chittenden Co., July 7, 1911, *Kent* (N, mixed with *P. Richardsonii*). MASSACHUSETTS: Spy P., Arlington, Middlesex Co., Sept. 21, 1880, herb. *C. E. Faxon;* near Fresh Pond, Cambridge, Middlesex Co., *Fernald & Weatherby, Plantae Exsiccatae Grayanae 111;* Cambridge Bot. Gard., 1864, *J. T. Rothrock;* Sudbury R., Concord, Middlesex Co., *Ogden 1502.* CONNECTICUT: Housatonic R., Derby, *E. H. Eames 11502;* Lake Zoar, Housatonic R., Southbury, New Haven Co., *E. H. Eames 11485.* NEW YORK: Lake Ontario, southwest of Chaumont, Jefferson Co., *Fernald, Wiegand & Eames 14089;* Pierrepont P., Woodville, Jefferson Co., *House 10069;* north end of Cossayuna L., Washington Co., *Muenscher & Lindsey 2739;* abandoned canal, Montezuma, Cayuga Co., *Eames & Wiegand 14535;* pool at Eldridge L., Chemung Co., upper waters of the Susquehanna, *Lucy 10814;* Renwick Flats, Ithaca, Tompkins Co., *Wiegand 11182;* Old Ice Pond, Ithaca, *R. Jones 7471;* Float Bridge, Rochester, *Baxter 5388;* Lake Washington Park, Albany, Albany Co., June 14, 1910, *S. H. Burnham.* NEW JERSEY: tide ditches, Camden, May 5, 1866, *C. F. Parker;* Camden, June 1879, *I. C. Martindale;* Clifton, *Nash 786;* Cedar Brook, Plainfield, May 1879, *Frank Tweedy.* PENNSYLVANIA: Conestoga, near Lancaster, June 19, 1861, *T. C. Porter;* Juaniata R., Huntingdon

Co., Aug. 1864, *T. C. Porter;* Lehigh R., Easton, July 11, 1868, *T. C. Porter;* Sharon, July 7, 1886, *F. T. Aschman;* outlet of pond on tributary to Pennypack Creek, Willow Grove, Montgomery Co., *Adams & Tash 512.* Delaware: Wilmington, 1863, *Wm. M. Canby;* Wilmington, June 1879, *A. Commons;* Wooddale, June 24, 1879, *A. Commons;* Faulkland, New Castle Co., June 1879, *A. Commons;* Greenbank, Oct. 16, 1879, *A. Commons.* Maryland: Spesutie Island, May 27, 1879, *J. D. Smith;* Cleft Island, Great Falls, *McAtee 2953.* District of Columbia: Fish Ponds, *Shull 15;* Georgetown, *VanEseltine & Moseley 201.* West Virginia: Fish Hatchery, White Sulphur Springs, Greenbrier Co., *Berkley 1215.* Virginia: Fourmile Run, Chesapeake Bay Region, *Shull 465;* near Four-mile Run, near Alexandria, *Blake 9472;* 1 mile s. w. of Williamsburg, *Grimes 3255;* Dyke, Fairfax Co., *Metcalf & Sperry 1631;* Claremont Wharf, Surrey Co., *Fernald & Long 7747.* Ontario: Toronto, *Scott 16439;* pool above Niagara Falls, *John Macoun 26830;* Kingston, June 15, 1901, *J. Fowler;* Sault Sainte Marie, Algoma Co., *Fassett 14746.* Michigan: Muskegon Lake, Muskegon State Park, 4½ mi. w. of Muskegon, Muskegon Co., *Hermann 8647;* Kalamazoo R., Kalamazoo Co., Aug. 15, 1938, *W. G. Erwin.* Reported from Ottawa Co., and Van Buren Co. by Oosting.[1] Indiana: Wolf L., June 7, 1913, *E. D. Hull;* east side of Wolf Lake, just w. of Whiting, Lake Co., *Deam 56607.* Illinois: Wolf L., Chicago, June 10, 1911, *E. E. Sherff;* Stony Island, Chicago, Cook Co., *Steyermark 4227;* Lake Nippersink, according to Tehon, Torreya **29:** 42 (1929), specimen not seen. Minnesota: Lake Minnetonka, *Keck & Stilwill 428* and *430;* Mississippi R., Wabasha Co., *Keck & Stevens 335;* Mississippi bottoms, below Winona, Aug. 6, 1931, *H. J. Oosting.* Missouri: Neosho, *Metcalf 948;* Blue Spring L. and Osage L., formed by Blue Springs, 2 mi. s. e. of Bourbon, Crawford Co., *Steyermark 16313.* South Dakota: Edmunds Co., July 1896, *D. Griffiths* (specimen in Herb. Brooklyn Bot. Gard., not seen; see Torreya **29:** 43 (1929)). Wyoming: Lakes Swastika and Irene, Medicine Bow mountains (specimens not seen; see Torreya **32:** 5 (1932)). California: cultivated at Pomona College, the plants brought from Santa Ana R., near Corona, "only known station in California," San Bernardino Co., *Parish 19248;* pond in botany lathhouse of Pomona College, planted by Johnston from Santa Ana R., *Munz 2785.* Oregon: near Silvies, Aug. 19, 1901, *Griffiths & Morris* (specimen in Herb. Brooklyn Bot. Gard., not seen; see Torreya **29:** 43 (1929)).

P. crispus is distinct from all other species of *Potamogeton* found in North America, and should never be confused with any

[1] Henry J. Oosting, Pap. Mich. Acad. Sci., Arts and Letters **15**: 165 (1932).

of them, for it is the only one with leaf-margins having a dentatation evident to the unaided eye. Its fruits are distinctive in having long (2–3 mm.) beaks. Fruits are usually not produced when the plant grows in deep water, but in shallow, warm pools it fruits freely. The winter-buds are especially distinctive, being large (1–2 cm. thick) and hard and horny. This species is not native to the Western Hemisphere but is introduced into North America where in some places it is growing profusely and acting as a weed. It evidently arrived here rather early for Pursh in 1814 reports it from "Canada to Virginia."[1] Bennett says, "The oldest dated American specimen I can find in England is in Mr. Cosmo Melvill's herbarium, 'Philadelphia, 1841–2, Gavin Watson & Kilvington.' One from Delaware in the British Museum Herbarium is probably older: it was collected by R. Eglesfeld Griffith of Philadelphia . . . "[2] In 1913, Hull[3] reports it as being abundant and acting as a weed around Chicago in waters connected to Lake Michigan. He believed the arrival of the plant to that region to have been quite recent. Tehon[4] believes the westward spread of the species in North America to be due to migrating water birds and suggests that its introduction to North America may be due to the same agents.

2. P. ALPINUS Balbis (American varieties)

RHIZOME about same thickness as stem, branching and creeping, pinkish, not spotted. STEM terete, 1–2 mm. in diameter, simple below, rarely branched above, often pressing very flat; stele with the trio-type pattern, the phloem on the inner face of the trio-bundle usually appearing as two distinct patches; endodermis of O-cells; interlacunar and subepidermal bundles absent; pseudo-hypodermis absent. SUBMERSED LEAVES (excluding transition-leaves) thin, delicate, translucent, oblong-linear to linear-lanceolate, 4.5–18 cm. long, 1–2 cm. broad, usually with 7 prominent nerves, sometimes also having 2 to 6 less prominent or incomplete ones, sessile and slightly clasping, apex obtuse or rarely acutish but never sharp-pointed; margin entire; lacunae along the midrib of rectangular cells, 4–6 rows near the base, 2 or 3 rows at the middle and 0–2 rows near the apex. FLOATING LEAVES thin, translucent, often poorly developed or absent, blades elliptical or oblanceolate to obovate or oblong-linear,

[1] Frederick Pursh, Fl. Am. Sept. 120 (1814).
[2] Arthur Bennett, Journ. Bot. 39: 201 (1901).
[3] E. D. Hull, RHODORA 15: 171 (1913).
[4] L. R. Tehon, Torreya 29: 42–46 (1929).

4–6.5 cm. long, 1–2 cm. wide, gradually tapering with no sharp distinction into a petiole 1–3 cm. long, with (7–) 9–13 (–15) prominent nerves, outer pair meeting the midrib a short distance back from the obtuse apex; lacunae along midrib of elongate cells near base and of oval cells near the middle, entire blade more or less lacunate with rounded lacunae. Stipules of submersed leaves thin, membranous, oblong, obtuse, faintly 2-keeled with 3 lateral nerves on each side, which meet the keel-nerves back from the apex, (1.2–) 1.5–2.5 (–4) cm. long, 2–8 mm. broad; those of the transitional and floating leaves similar but broader (up to 1 cm.) and with more nerves (15), some also between the more prominent keel-nerves. Peduncles same thickness as the stem, 3–10 (–16) cm. long. Spikes in anthesis more or less moniliform, especially at the base, with 5–9 whorls of flowers; in fruit cylindric and crowded, 1.5–3.5 cm. long, .8–1 cm. thick. Flowers on short pedicels .5–1 mm. long; sepaloid connectives orbicular to reniform, blades 1.2–2 mm. wide, claws .7–.8 mm. long; anthers oblong, .6–1 mm. long. Fruits mostly obovate, (2.5–) 3–3.5 mm. long (excluding beak), (1.7–) 2–2.4 mm. wide, lateral keels none or very low, dorsal keel thin, usually prominent and well developed upward, beak lateral, short and curved toward the back; exocarp smooth, pitted when immature, tawny-olive; endocarp with keels rounded, beak linear, 1–1.3 mm. long, curved toward the back, loop solid; apex of seed pointing toward basal end. Whole plant and especially the rachis of the spike usually suffused with red.

Two varieties in North America:

Submersed leaves oblong-linear to linear-lanceolate, 7–25 cm. long, usually more than 8 times as long as broad, tapering to an obtuse or acutish apex . . . . . 2a. var. *tenuifolius.*

Submersed leaves oblong to ovate-oblong, 4–10 cm. long, usually less than 8 times as long as broad, apex rounded and sometimes slightly cucullate . . . . . 2b. var. *subellipticus.*

2a. P. alpinus Balbis var. **tenuifolius** (Raf.), comb. nov.

P. tenuifolius Raf., Med. Repos. hex. 3, **2:** 409 (1811); Fernald, Rhodora **33:** 210 (1931). *P. lucens* sensu Michx. Fl. Bor.-Am. **1:** 101 (1803), in part, not L. (1753). *P. microstachys* Wolfg. in Schultes & Schultes, Mant. **3:** 360 (1827). *P. rufescens* "forma *angustifolia*" from Unalaska, C. & S., Linnaea **2:** 211 (1827). *P. obrutus* Wood, Cl.-Bk. ed. **2:** 525 (1847). *P. lucens* var.? *fluitans* (Roth) Gray, Man. ed. **2:** 435 (1856), as to synonyms *P. rufescens* Schrad. and *P. obrutus* Wood, not *P. fluitans* Roth. *P. alpinus* sensu Morong, Mem. Torr. Club **3:** no. 2: 19 (1893), in large part; sensu Graebn. in Engler, Pflanzenr. **4:** fam. 11: 70 (1907), as to Am. plant in large part; sensu Taylor, N. Am.

RANGES OF POTAMOGETON

Fl. **17:** pt. 1: 19 (1909) in large part; sensu Hagstr., Crit. Res. Pot. 141 (1916), as to Am. plant, in large part. *P. alpinus* proles *microstachys* (Wolfg.) Graebn. in Engler, Pflanzenr. **4:** fam. 11: 72 (1907). *P. montanense* Gandog., Bull. Soc. Bot. France **66:** 304 (1920). *P. microstachys* var. *typicus* Fernald, Rhodora **32:** 80 (1930). *P. alpinus* subsp. *tenuifolius* (Raf.) Hultén, Fl. Aleut. Is. 65 (1937) and Fl. Alaska and Yukon 98 (1941). *P. rufescens* sensu Am. authors, in large part, not Schrad.

Streams and cold ponds, southwestern Greenland, Labrador, and Hudson Bay to Alaska and the Aleutian Islands, south to Newfoundland, Nova Scotia, western Massachusetts and Pennsylvania, Colorado and California. Map 2. The following, selected from many specimens, are representative: Greenland: Itivnera, 64° 22′ N., Godthaab Fjord, Aug. 19, 1931, *M. P. Porsild;* Qagssiarssuk, 60° 53′ N., Igaliko-Fjord, Aug. 5, 1925, *A. E. & M. P. Porsild;* Igaliko, July 23, 1888, *L. Kolderup Rosenvinge.* Labrador: Rama, *A. Stecker* 332; Seal L., n. Lab., *Spreadborough 16429;* Grand Falls of Hamilton R., *M. T. Doutt 3296.* Newfoundland: Little Quirpon, Quirpon Harbor, *Wiegand & Hotchkiss 27337;* Highlands Brook above pond, Crabbes, *R. B. Kennedy 81;* shores of Conception Bay, Carbonear, *Fernald & Wiegand 4473;* Grand Falls, Valley of Exploits River, *Fernald, Wiegand & Darlington 4474;* Lookout Mountain, West Arm (South Arm of charts), Bonne Bay, *Fernald, Long & Fogg 1207;* Grand L., Bay of Islands, *A. C. Waghorne 6;* St. Georges P., between Bay St. George and Bay of Islands, *Fernald & Wiegand 2443* (approaching var. *subellipticus*). Quebec: Natashquan, Saguenay Co., *St. John 90083 & 90084;* Lac Duguay, Newport, Gaspé Co., *Proulx 58;* Riv. Mistassin, (Michaux Herb., Paris Museum, as *P. lucens,* type of *P. tenuifolius* Raf., as to plant on right); Lac William, Mégantic Co., *Victorin 11162;* shallow lagoon, head of Sargents Bay, Lake Memphremagog, Aug. 3, 1903, *Churchill;* Bolton Center, Sherbrooke Co., *Pease 26709;* La Sarre, Abitibi, *Louis-Marie 313;* lac tourbeux, Ville Montel, Abitibi Region, *Victorin, Rolland & Meilleur 43730.* Anticosti: Anticosti I., *Victorin & Rolland 27630.* New Brunswick: Junction of Restigouche and Matapedia Rivers, *Rousseau 32332;* Bass R., Nepisiquit, July 30, 1873, *J. Fowler;* St. John R., Connors, *Pease 2907.* Nova Scotia: Truro, Colchester Co., *Bean & White 22963;* Mahone Bay, Hamilton *64010.* Maine: White's Brook, Seven Islands, T. 13, R. 14 & 15, valley of the St. John R., Aroostook Co., *St. John & Nichols 2104;* St. John R., Madawaska, *Fernald 117;* Piscataquis R., Dover, Aug. 27, 1894, *Fernald;* Mattagodus Stream, Tredwell School, Prentiss, Penobscot Co., *Steinmetz 323;* Haley Pond, Rangeley, Franklin Co., Sept. 1, 1894, *K. Furbish;* Pembroke, Washington Co., *Fernald 1622;* Sydney, Kennebec

Co., *Fernald & Long 12388*. NEW HAMPSHIRE: Colebrook, Coös Co., *Pease & Fernald 17024* (app. v. *subellipticus*); Horseshoe P., Northumberland, Coös Co., *Pease 17270* (app. v. *subellipticus*); Cherry P., Jefferson, Coös Co., July 1829, *J. W. Robbins;* bayou of the Connecticut R., Hanover, July 12, 1910, *E. F. Williams* (flaccid form). VERMONT: Harvey's P., W. Barnet, Sept. 7, 1885, *F. Blanchard;* Windsor, Sept. 6, 1881, *Geo. Leland;* "e flumine Passumpsic," *A. Wood* (original collection of *P. obrutus*). MASSACHUSETTS: Richmond, Sept. 19, 1864, *Robbins*. NEW YORK: Preble, Cortland Co., July 31, 1886, *Dudley;* Paradox L., *Muenscher & Lindsey 2712;* Black R., Dexter, Jefferson Co., *Fernald, Wiegand & Eames 14082;* n. of R. R. bridge, Cayuga, Cayuga Co., Oct. 1886, *W. R. Dudley* (mixed with *P. illinoensis* in US); Oxford, June 30, 1886, *F. V. Coville*. PENNSYLVANIA: near Easton, Aug. 4, 1869, *Thos. C. Porter*. ONTARIO: Cross L. Portage, Temagami Forest Reserve, *Krotkov 5142* (app. v. *subellipticus*); Current R., July 20, 1869, *John Macoun;* "Bruce Co., Peninsula," 1871, *John Macoun*. MICHIGAN: Isle Royale, *W. S. Cooper*, no. "254 in part"; Dead R., Marquette, *C. F. Wheeler 26;* 3 mi. n. e. of Watersmeet, Gogebic Co., *Bessey B & D 2781;* Beaver R., Petoskey, July 2, 1878, *E. J. Hill;* Alma, Aug. 11, 1893, *C. A. Davis;* Chatham, *C. F. Wheeler 90*. WISCONSIN: White Sand L., Vilas Co., Aug. 11, 1930, *J. P. E. Morrison;* Minocqua, Oneida Co., *Fassett 5343;* between McNaughton and Rhinelander on Wis. R., *L. S. Cheney 1501*. MANITOBA: Churchill, *Polunin 1976, 1977, & 2062*. MINNESOTA: Lake Kilpatrick, Cass Co., Aug. 1893, *C. H. Bullard* (app. v. *subellipticus*); n. end of Squaw L., Clearwater Co., *Moyle 894* (app. v. *subellipticus*); SOUTH DAKOTA: Boulder Creek, Boulder Canyon, Lawrence Co., *Over 13817* (app. v. *subellipticus*). MACKENZIE: Setidgi L., 68° 28′ N., 132° 20′ W., Aug. 21, *A. E. & R. T. Porsild;* McTavish Bay, Great Bear L., 66° 23′ N., 117° 40′ W., *A. E. & R. T. Porsild*. SASKATCHEWAN: Cornwall Bay, L. Athabasca, 59° 27′ 30″ N., 108° 27′ 30″ W., *Raup 6618, 6621, & 6622*. Archibald R., vicinity of Wolverine Pt., L. Athabasca, 59° 9′ N., 108° 25′ W., *Raup 6741*. ALBERTA: Slave Lake Dist., *Brinkman 4541;* Vermillion Lakes, Banff, *Macoun 4365*. MONTANA: Medicine Lakes, *Maguire 472;* Swift Current Creek, *Maguire 474;* Trout Lake, *Maguire & Piranian 5442;* Rost L., Big Fork, *Whitford 258;* Swift Current Creek, below Lake McDermott, Glacier Nat'l Park, *Standley 16855;* Swan R. at Elbow (Lindberg) L., Mission Range, Missoula Co., *G. B. & R. P. Rossbach 16*. IDAHO: Kootenai Co., Sept. 1887, *J. H. Sandberg*. WYOMING: Shoshone Lake, Yellowstone Nat'l Park, *Rydberg & Bessey 3724* (TYPE no. of *P. montanense* Gandog.) *& 3725;* Heart Lake Creek, Yellowstone region, Sept. 3, 1878, *C. Richardson* (mixed with v. *subel-*

lipticus in US). Colorado: Lake Eldora, Boulder Co., *Clokey 3118;* Georgetown, *M. E. Jones 734;* Walton Creek, Routt Co., July 1891, *A. Eastwood;* vicinity of Twin Lakes, July–Aug., 1902, *C. Juday;* Seven Lakes, *F. E. & E. S. Clements 491;* Grand Lake, *Shear & Bessey 5328;* Howe P. O., Larimer Co., *Osterhout 2885;* Tomichi R., Parlin, Gunnison Co., Aug. 20, 1901, *Benj. H. Smith.* Utah: Clayton Peak, Wasatch Mts., Aug. 12–26, 1903, *S. G. Stokes;* Twin Lakes, Alta, Wasatch Mts., *M. E. Jones 1297;* Silver L. at Brighton, Big Cottonwood Canyon, Salt Lake Co., *Maguire & Richards 13156;* Bridger L., Uinta Mts., Summit Co., *Rollins 2319;* Brighton, *M. E. Jones 6606.* California: North Fork of Kings R., *Hall & Chandler 563*, region of Kaweah Peaks, Funston's Meadows, Tulare Co., *Dudley 2201;* Webber L., Sierra Co., Aug. 3, 1894, *Dudley;* Silver Valley, Alpine Co., *Brewer 1978.* Oregon: in a warm spring, Harney Valley, June 10, 1885, *T. Howell* (mixed with *P. illinoensis*). Washington: Trout Creek, w. Klickitat Co., *Suksdorf 2172;* Falcon Valley, Mt. Adams, Sept. 1879, *Suksdorf;* Baker L., Whatcom Co., *Muenscher 7657a & 7658.* British Columbia: Kicking Horse L., Rocky Mts., Aug. 17, 1890, *John Macoun 4162;* Revelstoke, *John Macoun 4163;* Barkerville, *McCabe 43;* Nanaimo, Vancouver I., *John Macoun 4167 & 4167a.* Yukon: Bonanza Creek, *John Macoun 78320 & 78321.* Alaska: Goldstream Cr. and Pedro Dome, 65° 0′ N., 147° 30′ W., *A. E. & R. T. Porsild 114;* Buckland R., 65° 55′ N., 161° 0′ W., *A. E. & R. T. Porsild 1496;* Afognak L., Afognak Island, Shelikof Strait off Alaska Pen., Aug. 1931, *W. H. Rich;* Kodiak Island, *Trelease 2870 & 2871;* Shumagin Islands, *Saunders 2869;* False Pass, Unimak Island, Aleutian Islands, *Eyerdam 2141;* Unalaska (type-locality of *P. microstachys*), *Van Dyke 202,* also *Eyerdam 2360,* and *Hultén 7573;* Seldovia, *Piper 4426;* Kukak Bay, Alaska Pen., *Coville & Kearney 1564;* Olga Bay, Kodiak Island, *E. H. & H. B. Looff 1501.*

2b. P. alpinus Balbis var. **subellipticus** (Fernald), comb. nov.

P. microstachys var. *subellipticus* Fernald, Rhodora **32:** 82 (1930). *P. alpinus*, sensu Morong Mem. Torr. Club **3:** no. 2: 19 (1893), in small part; sensu Graebn., in Engler, Pflanzenr. **4:** fam. 11: 70 (1907), as to N. Am. plant in small part; sensu Taylor, N. Am. Fl. **17:** pt. 1: 19 (1909), in small part; sensu Hagstr., Crit. Res. Pot. 141 (1916), as to Am. plant in small part. *P. tenuifolius* var. *subellipticus* Fernald, Rhodora **33:** 211 (1931).

Shallow pools and slow streams, Newfoundland, south to southern Vermont and eastern New York, sparingly westward to Wyoming and Montana. Map. 3. The following are referred here: Newfoundland: Salmonier R., 1931, *Agnes Ayre;* Flower Cove, Straits of Belle Isle, *Fernald & Long 26221*, also *Hotchkiss*

27338; Stephenville, region of Bay St. George, *Fernald, Wiegand & Kittredge 2442;* Port à Port, *Mackenzie & Griscom 10047.* QUEBEC: Ile à la Proie, Archipel de Mingan, *Victorin & Rolland 20462;* Locked Camp, Rivière Cap Chat, Matane Co., *Victorin, Rolland & Jacques 44451;* Maria, Bonaventure Co., *Victorin, Rolland & Jacques 33315;* between Baldé and the Baie des Chaleurs, Bonaventure R., Bonaventure Co., *Collins, Fernald & Pease 5911;* Georgeville, *Pease 1919;* Charlton Island, about 52° N., 79° 30′ W., James Bay, *A. E. Porsild 4296;* Lac Philippe, Ladysmith, Pontiac Co., *Gauthier 2446.* ANTICOSTI: Rivière Sainte-Marie, *Victorin & Rolland 25938;* Rivière au Saumon, *Victorin, Rolland & Louis-Marie 20467.* MAGDALEN ISLANDS: East Cape and East Point, Coffin Island, *Fernald, Long & St. John 6766,* (TYPE in Gray Herb.); Ile de Havre-au-Ber, *Victorin & Rolland 9923.* NEW BRUNSWICK: Eel R., Dalhousie, *Svenson & Fassett 3028.* NOVA SCOTIA: Baddeck Bay, Victoria Co., *Fernald & Long 19687.* MAINE: Houlton, Aroostook Co., 1881, *K. Furbish,* also *Fernald & Long 12387;* Foxcroft, Piscataquis Co., Sept. 5, 1894, Sept. 15, 1894 & Aug. 31, 1896, *Fernald.* VERMONT: Little Leech Pond, Averill, Essex Co., *Eggleston 1656;* Willoughby, Orleans Co., Aug. 4 & 11, 1881, *E. Faxon;* "Nigger" P., Westmore, Orleans Co., *Eames & Godfrey 9334;* West Burke, *Redfield 8014;* Evart's P., Windsor, Aug. 27, 1933, *Weatherby & Griscom.* NEW YORK: Minerva Brook, east of Minerva, Essex Co., *House 15182;* Niagara Falls, Aug. 21, 1886, *Morong;* Paradox L., Essex Co., *Killip 12605* (mixed with *P. amplifolius* in US). ONTARIO: Howdenvale, *Watson 3144 & 3145;* River Trent, *John Macoun 4168;* Batchawana Falls, Algoma Dist., *Taylor et al. 294.* MICHIGAN: Eagle Harbor, Keweenaw Pen., 1863, *Robbins;* North Cliff, Keweenaw Co., Aug. 1, 1888, *O. A. Farwell;* west branch Ontonagon R., Tenderfoot L., Gogebic Co., *Hotchkiss & Koehler 4349.* WISCONSIN: Three Lakes, Oneida Co., Aug. 5, 1918, *R. Hoffman;* n. w. end of Big Arbor Vitae L., Vilas Co., *Hotchkiss & Martin 4460.* MINNESOTA: Lake Kilpatrick, Cass Co., Aug. 1893. *C. A. Ballard;* Gull L., Cass Co., Aug. 1893, *A. P. Anderson.* SASKATCHEWAN: Archibald R., vicinity of Wolverine Pt., L. Athabasca, about 59° 9′ N., 108° 25′ W., *Raup 6742.* MONTANA: Lake Josephine, Glacier Nat'l Park, *Maguire 473.* IDAHO: west end of Fernan L., Coeur d'Alene, *Rust 384.* WYOMING: Heart Lake Creek, Yellowstone region (mixed with v. *tenuifolius* in US; sheet in G not mixed); e. fork of Big Sandy, Wind River Mts., all 1878, *C. Richardson.* BRITISH COLUMBIA: Austey Creek, Shuswap L., *J. M. Macoun 4166.*

In 1930, Fernald showed that the American and eastern Asiatic plant which had been passing as *P. alpinus* Balbis of

even stranded along the shore, while many specimens of var. *subellipticus* show evidences of having developed in deep water.

3. P. POLYGONIFOLIUS Pourret

RHIZOME buff or pinkish, often with cinnamon spots, about same thickness as stem. STEM simple, .7–2 mm. in diameter; stele with the proto-type pattern; endodermis mostly of O-cells; interlacunar bundles absent; subepidermal bundles present; pseudo-hypodermis 1 or 2 cells thick. SUBMERSED LEAVES (usually absent) with blades lanceolate, 3–10 cm. long, .5–1.5 cm. wide, tapering gradually at both ends, apex acutish but not sharp-pointed, petiole 1–3 cm. long; nerves 7–11, outer ones marginal; lacunae rather obscure, of 2–4 rows each side of midrib; margin entire. FLOATING LEAVES coriaceous, ovate, apex tapering to an obtuse tip, base rounded or slightly cordate, petioles 1–15 cm. long, blades 3–8 (–9) cm. long, 1–4 cm. wide, nerves (11–) 15–19 (–21), all of about equal prominence; lacunae none. STIPULES about 3 cm. long, somewhat persistent, without keels or practically so. PEDUNCLES about same thickness as stem, 4–12 cm. long. SPIKES with about 10 whorls, in fruit 2–3 cm. long, .5–.7 cm. wide. FLOWERS sessile or nearly so; sepaloid connectives greenish, blades orbicular or elliptical, 1–2 mm. wide, claws .3–.7 mm. long; anthers .6–.8 mm. long. FRUITS obovate to orbicular, rounded at base, sides with a depression, especially if immature, (1.6–) 2–2.5 mm. long, (1.2–) 1.5–2.1 mm. wide; beak minute or obsolete; keels absent or nearly so; exocarp reddish; endocarp loop often with a large cavity; apex of seed pointing toward the basal end or slightly above.

P. polygonifolius Pourr., Mém. Acad. Toulouse **3:** 325 (1788); Benn., Bot. Gaz. **32:** 58 (1901); Graebn. in Engler. Pflanzenr., **4:** fam. 11: 65 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 21 (1909); Hagstr., Crit. Res. Pot. 175 (1916).

Shallow pools and muddy brooks. Eastern Newfoundland, St. Pierre Island, and on Sable Island. MAP 4. Europe, northern Africa. NEWFOUNDLAND: George's Brook, near Clarenville, Aug. 1933, *Ayre;* Carbonear, Avalon Pen., *Fernald & Wiegand 4468;* Brigus Junction, Avalon Pen., *Fernald & Wiegand 4467;* Whitbourne, *Robinson & Schrenk 231;* near Portugal Cove, Avalon Pen., *Fernald, Long & Dunbar 26218;* Topsail, *C. S. Williamson 455.* ST. PIERRE ET MIQUELON: Savoyard, St. Pierre, *Arsène 41.* NOVA SCOTIA: Sable Island, 43° 59′ N., 59° 47′ W., *St. John 1121 & 1122.*

P. polygonifolius ranges through Europe, Algeria, Morocco, Madeira and the Azores[1], but appears in the western hemisphere

[1] The old world range of this species is taken from Hagström, Crit. Res. Pot. 178 (1916). It is also given a widespread Asiatic range by Bennett, Bot. Gaz. **32**: 59 (1901).

only in eastern Newfoundland, the island of St. Pierre close by, and Sable Island off Nova Scotia. It may be presumed that this species in America, now confined to areas that largely escaped the last continental glaciation, once had a much wider range.

This species has a strong tendency to produce floating leaves which often spring almost directly from the rhizome. Terrestrial forms are common and in such condition may survive in ponds that dry up for a part of the summer.[1]

4. P. AMPLIFOLIUS Tuckerman

RHIZOMES whitish or often with a reddish cast, 2–4 mm. in diameter, scales black, broadly obtuse. STEM terete, 1–3.5 mm. in diameter, simple or forming short branches late in the season; stele with the proto-type pattern; endodermis of O-cells; interlacunar bundles present throughout; subepidermal bundles absent; pseudo-hypodermis 1 or 2 cells thick. SUBMERSED LEAVES (excluding transition leaves) of two more or less distinct types: those on the lower part of the stem lanceolate, dark green and usually badly decayed by the time the floating leaves appear, with 19–25 nerves: those of the upper part of the stem broadly lanceolate to ovate with margins much longer than midrib giving those leaves just below the floating ones a characteristic arcuate appearance, with 23–37 nerves; both types obtuse or acutish at apex, but never sharp-pointed, and tapering to petioles 1–6 cm. long; blades 8–20 cm. long, 2.5–7.5 cm. wide; margins entire; lacunae 3–6 rows each side of midrib. FLOATING LEAVES with gradual transitions from the submersed ones, coriaceous, opaque, ovate to elliptical, apex rounded or bluntly mucronate, base cuneate or rounded, petioles 8–20 cm. long, blades 5–10 cm. long, 2.5–5 cm. wide, with (21–) 29–41 (–51) nerves, about ¼ of the nerves more prominent than the others, as seen by transmitted light; lacunae none. STIPULES of the submersed leaves somewhat persistent, fibrous, triangular, obtuse when young, becoming twistedly stringy with age, 3.5–11 cm. long, obscurely 2-keeled; those of the floating leaves similar, 5–12 (–18.5) cm. long, with 2 fairly well marked keel-nerves and 30–40 fine nerves. PEDUNCLES at base about same thickness as stem, but usually thicker at the middle or upper half, 4–30 cm. long. SPIKES with 9–16 whorls; in fruit 4–8 cm. long, 1–1.5 cm. thick. FLOWERS sessile or on very short pedicels up to 1 mm. long; sepaloid connectives usually with a reddish cast, sometimes greenish, blades orbicular to elliptical, (1.2–) 1.5–3 (–3.5) mm. wide, claws .4–.8 (–1) mm. long; anthers .8–1.5 (–2) mm. long.

[1] See Harold St. John, Sable Island, etc., Proc. Bost. Soc. Nat. Hist. 36: no. 1: 59 (1921).

Fruits obovate, rounded on the back, cuneate at base, sides flat, 3.5–4.5 (–5) mm. long (excluding beak), 2.5–3.3 (–3.7) mm. wide, beak often prominent, up to 1 mm. long; keels usually prominent but sometimes rounded or obscure, the dorsal one often strongly developed, especially at the middle; exocarp usually reddish or orange-brown if fully mature, otherwise greenish; endocarp with 3 prominent, acutish and often somewhat muricate keels, beak linear, facial, about 1 mm. long, loop solid; apex of seed pointing .6–1.5 mm. above the basal end. Robust plants characterized by several large arcuate submersed leaves clustered just below the water surface, and floating leaves with numerous nerves.

P. amplifolius Tuckerm., Am. Journ. Sci. ser. 2: **6:** 225 (1848); Morong, Mem. Torr. Club. **3:** no. 2: 16 (1893); Graebner in Engler, Pflanzenr. **4:** fam. 11: 67 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 18 (1909); Hagstr., Crit. Res. Pot. 163 (1916). *P. lucens* var. ? *fluitans* (Roth) Gray, Man. ed. 2: 435 (1856), as to plants included in part, not *P. fluitans* Roth. *?P. amplifolius* forma *amphibius* Benn., Journ. Bot. **42:** 70 (1904). *?P. amplifolius* var. *ovalifolius* Morong ex Benn., Journ. Bot. **42:** 70 (1904); ? Graebn., in Engler, Pflanzenr. **4:** fam. 11: 68 (1907). *?P. amplifolius* var. *amphibius* (Benn.) Graebn. in Engler, Pflanzenr. **4:** fam. 11: 68 (1907). *Spirillus amplifolius* (Tuckerm.) Nieuwl., Am. Mid. Nat. **3:** 16 (1913). *P. amplifolius* forma *homophyllus* Hagstr., Crit. Res. Pot. 163 (1916).

Lakes and streams, usually in deep water. Newfoundland, south to Virginia and Tennessee, west to Missouri and Kansas, also in California, Oregon and Washington. Map 5. The following, selected from many specimens, are representative: Newfoundland: Salmonier R., 1931, *Ayre;* Frenchman's Cove, Bay of Islands, *Mackenzie & Griscom 10045.* Quebec: Lac Sainte-Anne, *Victorin, Rolland & Jacques 33517;* New Richmond, Bonaventure Co., *Victorin, Rolland & Jacques 33858;* Lake Memphremagog, July 29, 1902, *J. R. Churchill;* Rivière-aux-Serpents, Oka, *Victorin 20457, 21201 & 25815;* East Templeton, *John Macoun 85534;* East Templeton near Hull, *Malte 118267 & 118268.* McGregor L., *J. M. Macoun 86002;* Lac Lepêche, *Rolland 13044;* Otter L., Pontiac Co., *Gauthier 2422;* Lac Donaldson, Buckingham, *Rouleau 7231;* Kondiaronk (Lac Creux), *Victorin 16065.* Nova Scotia: Mill Brook, Sheffield's Mills, Kings Co., Aug. 24, 1902, *Fernald;* Young's L., North Mt., Belle Isle, Annapolis Co., *Fernald, Bartram, Long & Fassett 23139;* Lily L., Sandy Cove, Digby Co., *Fernald & Long 19688;* Little Meteghan L., Digby Co., *Fernald & Long 23140;* Sloane L., Pleasant Valley, Yarmouth Co., *Fernald,* et al. *19689.* Maine: Saint Francis R., Aroostook Co., Aug. 13, 1902, *Eggleston & Fernald;* St. John P., T. 6, R. 17, Somerset Co., *St. John &*

Nichols 2108; Eagle L., Piscataquis Co., *Ogden 1704;* E. Eddington, Penobscot Co., Aug. 21, 1897, *Fernald;* Harvey's P., Levant, Penobscot Co., *Ogden & Marston 1693*, *Plantae Exsiccatae Grayanae 904;* Loon L., Franklin Co., 1894, *Furbish;* Middle P., S. Poland, Androscoggin Co., Sept. 1893, *Furbish.* NEW HAMPSHIRE: Lime Pond, Columbia, Coös Co., *Pease 13883;* York P., Kilkenny, Coös Co., *Pease 17185;* Burns P., Whitefield, Coös Co., *Pease 14585*, also *Moore 5036;* Wolfboro, Carroll Co., *R. A. Ware 3326;* Squaw Cove, Squam L., Sandwich, Carroll Co., July 21, 1923, *Svenson;* Dublin, Cheshire Co., Aug. 8, 1931, *Eaton & Griscom;* Johnson Creek, Madbury, Strafford Co., *Hodgdon 2652.* VERMONT: Little Leech P., Averill, Essex Co., *Eggleston 1655;* Long Pond, Willoughby, Orleans Co., July 26, 1896, *Kennedy;* Willoughby L., Aug. 31, 1917, *E. J. Winslow;* Missisquoi Bay, Lake Champlain, Swanton, Franklin Co., Sept. 14, 1909, *A. E. Blewitt;* Spectacle L., Rutland Co., July 21, 1907, *E. C. Kent;* Big P., Rutland Co., Aug. 29, 1895, *E. C. Kent;* Chittenden, Aug. 18, 1895, *Eggleston.* MASSACHUSETTS: Wenham P., Wenham, Essex Co., July 13, 1895, *J. H. Sears;* Fresh P., Cambridge, Middlesex Co., many collectors; Concord R., Billerica, Middlesex Co., *Fernald & Abbe 2506;* Sudbury R., Concord, Middlesex Co., Aug. 4, 1886, *Morong*, also Aug. 4, 1886, *Deane*, also *Ogden & Wiggins 1729;* Wood's P., Wellesley, Norfolk Co., Aug. 1, 1881, *Morong;* Middleboro, Plymouth Co., Aug. 12, 1901, *J. Murdock;* Quinsigamond P., Worcester, June 29, 1864, *Robbins;* Great Brook, Southwick, Hampden Co., *Seymour 249;* Spectacle P., Sandisfield, Berkshire Co., June 27, 1912, *R. Hoffmann;* Egremont, *Standley & Killip 7648.* RHODE ISLAND: Pawtuxet R., Cranston, Providence Co., July 6, 1898, *J. F. Collins;* Apponaug P., "Kingston," [Apponaug Pond is in the town of Warwick] Washington Co., Aug. 26, 1880, *Morong.* CONNECTICUT: Thompson, Windham Co., June 10, 1922, *Eaton & Fassett;* East Granby, Hartford Co., *Weatherby D2409;* Hamlins P., Plainville, Hartford Co., *Blewitt 632;* Quinnipaug P., Guilford, New Haven Co., Sept. 1886, *W. R. Dudley;* Seldens Cove, Lyme, Aug. 29, 1901, *C. H. Bissell;* Mudge P., Sharon, *Weatherby & Anderson 5901;* Colebrook, Aug. 13, 1850, *J. W. Robbins;* West Goshen, Aug. 1892, *L. M. Underwood;* Twin Lakes Station, Salisbury, Litchfield Co., Aug. 20, 1935, *Fernald & Ogden.* NEW YORK: Mouth of Perch River, Jefferson Co., *Muenscher & Maguire 1600;* Spencer Lake, Spencer, Tioga Co., *Eames & Wiegand 11172;* Pierrepont P., Woodville, *House 8838*, also *Ogden & Bolan 1583;* Indian L., Franklin Co., *Muenscher & Maguire 719;* Eagle L., Essex Co., *Killip 12610;* Bemus Point, Lake Chautauqua, Aug. 8, 1896, *Churchill;* Edick Creek near Sears P., Lewis Co., *Hotchkiss 2646;* Rockland L., July 17, 1892, *Morong;* Carpenters P., Fabius, Onondaga Co., *House 1329;* Waldorf P., s. of North

Chatham, Columbia Co., *House 21752;* Pine P. (Gypsy L.), Putnam Co., *Muenscher & Curtis 5423;* Sodus Bay, *Killip 12261;* Lake Luzerne, Luzerne, Warren Co., *Fogg 4934;* Hudson R., Coveville, Saratoga Co., *Muenscher & Lindsey 2723;* North Harpersfield, Delaware Co., *Topping 203;* near Peekskill, Westchester Co., 1868, *LeRoy.* New Jersey: Delaware R., Camden, Oct. 7, 1877, *C. F. Parker;* Pensauken, Camden Co., *Adams & Trudell 378;* Swartswood L., Sussex Co., *Griscom & Mackenzie 10679;* Cranberry L., Sussex Co., *Mackenzie 2305;* Sparta, Sussex Co., Sept. 13, 1887, *N. L. Britton;* Hackensac R., Bergen Co., July 25, 1861, *C. F. Austin.* Pennsylvania: Martin's Creek, Northampton Co., Aug. 29, 1906, *C. S. Williamson;* Lehigh above Easton, June 15, 1869, *Thos. C. Porter;* Brandywine Creek, Icedale, Chester Co., Sept. 18, 1927, *H. E. Stone.* District of Columbia: near Washington, *Coville 129;* Eastern Branch below Navy Yard, Sept. 1, 1900, *E. S. Steele.* Maryland: Mouth of Mill Creek, Chesapeake Bay Region, *G. H. Shull 97.* West Virginia: Minnehaha Springs, Pocahontas Co., July 31, 1930, *W. V. U. Bot. Exped.;* also *E. E. Berkley 1387;* Huttonsville, Randolph Co., *Moore 2488.* Virginia: Four Mile Run, *Shull 413 & 473;* June 6, 1899, *E. S. Steele;* Dyke, Fairfax Co., *Metcalf & Sperry 1621, 1634, & 1639;* Hunting Creek, Dist. of Columbia and vicinity, *McAtee 2237 & 2279.* Georgia: Lafayette, Walker Co., *Wilson 189.* Ontario: Plevna, Aug. 19, 1902, *J. Fowler;* Epilobium Bay, Bear Island, *Watson 1178;* Whitney L., 12 mi. n. of Temagami, *Kane 1030;* Bass Creek, Franks Bay, Lake Nipissing, *Chitty 319;* McGregor Bay, Manitoulin District, *Ogden & Bolan 1647;* Gore Bay, Manitoulin Island, *Pease & Ogden 25032;* Old Woman's R., Bruce Pen., *Krotkov 8629;* Gull L., Addington Co., July 15, 1870, *John Macoun;* Belleville, Hastings Co., July 1876, *John Macoun;* Lac Meach, Ottawa, *Rolland 8697.* Michigan: Isle Royale, *Cooper 93 & 215;* Lake Manganese, Copper Harbor, Keweenaw Co., *Hermann 8233;* Carp R., Porcupine Mts., Aug. 16, 1923, *H. T. Darlington;* Crystal Falls, Iron Co., *Metcalf 2242, 2250, 2254 & 2255;* Michigamme L., Iron Co., *Metcalf 2209 & 2210;* Whitefish L., Mackinac Co., *Metcalf 2321;* Chassell, Houghton Co., *Pease & Ogden 25167;* Black L., Cheboygan Co., Aug. 3, 1935, *Gleason;* Little Manistee R., Manistee, Aug. 8, 1882, *Morong;* Washtenaw Co., July 17, 1838, *Houghton;* Mill-pond, Alma, Aug. 11, 1893, *C. A. Davis;* Kalamazoo R., Allegan Co., *Wight 97 & 109;* Kimble L., Vicksburg, Kalamazoo Co., July 5 & 28, *F. W. Rapp;* Sister Lakes, Van Buren Co., *De Selm 24* (F, mixed with *P. natans*); Papaw L., Berrien Co., *Dodge 172;* Haslet, *Yuncker 361.* Ohio: Geauga L., Portage Co., *Webb 546;* Phalanx, Trumbull Co., *Webb 452;* Cowles Creek Marsh, Ashtabula Co., Aug. 15, 1894, *Goodrich 209;* East Harbor, Ottawa Co., Aug. 10, 1898, *E. L. Moseley;* Put-in-Bay, Aug.

1898, *A. J. Pieters.* INDIANA: Lake Maxinkuckee, *Scovell & Clark 1223*, also *Clark 5 & 10*, also *Scovell 26* (US, mixed with *P. natans*) *& 28*, also *Evermann 1223;* 4.3 mi. south of Hayden, Jennings Co., *Deam 48399;* Loon L., Whitley Co., *Deam 49399;* Lake Manitou, Rochester, Fulton Co., *Deam 56490;* Wolf L., Whiting, Lake Co., *Deam 56616;* Wolf L., Lake Co., Aug. 18, 1920, *D. C. Peattie;* Hamilton L., Hamilton, Steuben Co., *Deam 56683;* Pine L., 2 mi. n. w. of La Porte, La Porte Co., *Deam 52425.* KENTUCKY: a specimen without locality data except "C. W. Short, M.D., Lexington, Kentucky." (NY). TENNESSEE: Mill-Sharp Lane, Lost Creek, Union Co., Aug. 2, 1933, *J. K. Underwood.* ALABAMA: Larkin Fork of Paint Rock R., Jackson Co., June 25, 1932, *Harper.* WISCONSIN: Green Bay, June 29, 1890, *Schuette;* Madison, July 30, 1889, *Trelease;* Lake Mendota, Madison, Dane Co., July 26, 1905, *A. B. Stout;* Lake Mendota, Aug. 20, 1912, *R. H. Denniston;* Hill L., Minocqua, Oneida Co., *Fassett 5362;* Deer L., Polk Co., Aug. 1892, *F. H. Burglehaus;* Pell L., Bloomfield Twp., Walworth Co., *Hotchkiss & Koehler 4192;* Kakagon Slough, Odanah, Sanborn Twp., Ashland Co., *Hotchkiss & Koehler 4353;* Pewaukee L., Milwaukee Co., Aug. 1884, *H. E. Hasse;* near Lac Vieux Desert, *Cheney 1735.* ILLINOIS: Lake Villa, Lake Co., *Gleason & Shobe 176;* Wolf L., Chicago, *Chase 1710;* Chicago R., Cook Co., July 21, 1906, *F. C. Gates;* Englewood, June 15–July 22, 1880, *herb. C. E. Faxon*, also July 22, 1880, *E. J. Hill;* Dupage R., Warrenville, *Moffat 294.* MINNESOTA: De Soto L., Becker Co., *Grant & Oosting 3275;* Cedar L., Rice Co., Oct. 22, 1891, *E. Douglas;* Lake Koronis, Stearns Co., *Kubichek 115b* (US, mixed with *P. natans*) *& 120;* Centre City, *Sandberg 658;* Chisago L., *Metcalf 1140 & 1160;* Center City, *Sandberg 656;* Basswood L., Lake Co.; *Metcalf 1511;* Tait L., Kandiyohi Co., *Metcalf 2024;* Leech L., Cass Co., *Shunk & Manning 553;* Mille Lacs L., Mille Lacs Co., *Keck & Stevens 332;* Dudley L., *Keck & Stilwill 377;* L. Minnetonka, *Keck & Stilwill 433;* St. Louis L., Stearns Co., *Linsdale & Keck 54;* Maple L., Wright Co., *Linsdale & Keck 115;* Lake Francis at Elysian, Le Lever Co., *Moyle 2261.* IOWA: Clear L., Cerro Gordo Co., July 11, 1896, *B. Shimek.* MISSOURI: Poplar Bluff, Aug. 14, 1892, *F. W. Dewart;* Nettleton, Caldwell Co., May 7, 1893, *H. Eggert* (M, mixed with *P. pulcher*); Ha-ha-tonka, Camden Co., *Metcalf 929;* Gravois Mills, Morgan Co., *Metcalf 888*, also *Steyermark 28071;* Brice, Laclede Co., *Geo. Moore 81;* Niangua R., near Bennett Spring State Park, Dallas Co., *Steyermark 13782;* Eleven Point R., about 5 mi. n. e. of Peace Valley, Howell Co., *Steyermark 14487;* Jack's Fork of Current R., 5 mi. s. e. of Arroll, Texas Co., *Steyermark 14624;* near Double Spring (Rainbow Spring), 4 mi. n. e. of Dormis and 4 mi. s. e. of Dora, Ozark Co., *Steyermark 15560.* ARKANSAS:

Paragould, Green Co., June 27, 1893, *H. Eggert;* Powers Creek, 12 mi. s. w. of Batesville, *Coville 189.* North Dakota: Antler Creek, Antler, *Bergman 2484.* South Dakota: Lake Hendricks, Brookings Co., *Griffiths & Schlosser 4;* Little Minn. R., Roberts Co., *Over 15425 & 17142;* Pickerel L., Day Co., *Over 14459 & 17141.* Nebraska: Lincoln, *Webber 4;* Greenwood, *T. A. Williams 344;* Antelope Creek, Cedar Co., *Clements 2979.* Kansas: Comanche Co., *A. S. Hitchcock 1000;* Ellis, July 1876, *S. Watson;* Decatur Co., *A. S. Hitchcock 1099;* Spring P., Cottonwood Springs, Chase Co., Aug. 1870, *E. Hall.* Oklahoma: Sapulpa, *Bush 1318;* Cache, Comanche Co., *Stevens 1364* (US, mixed with *P. nodosus*). Montana: Fish L., Glacier Nat'l Park, *Standley 18528.* Idaho: Priest L., *Piper 3684,* also *MacDougal 303;* Alturus L., *Evermann 493.* California: Red L. above Soda Springs of the San Joaquin, Aug. 16, 1899, *J. W. Congdon;* Satcher L. near Devils' Post Pile, Madera Co., *Ferris 8845;* Webber L., Sierra Co., Aug. 1894, *Dudley.* Oregon: Salem, *E. Hall 487, 488 & 488a;* Ten-mile L., near Lakeside, Coos Co., *Peck 9026;* Sauvies Island, *Thomas Howell 1498.* Washington: Olympic Mts. near the coast, Clallam Co., *A. D. E. Elmer 2798;* Pullman, *Henderson 2474;* 28 mi. south of Tacoma on the Mt. Rainier Rd., Pierce Co., *Abrams 9241;* Blakeley Island, San Juan Islands, *S. M. & E. B. Zeller 1238;* Lake Whatcom, Whatcom Co., *Muenscher 7633 & 7634;* Lake Leland, Jefferson Co., *Otis 1768.* British Columbia: Dick's L., Sooke, Vancouver Island, *John Macoun 4364;* Elk L. near Victoria, Vancouver Island, *John Macoun 88252.*

P. amplifolius is a robust plant of ponds and streams, usually preferring the deep, clear water. It grows vigorously in either acid or alkaline water. The submersed leaves persist in acid or neutral waters, but if lime is present, it precipitates on the leaves to such an extent that they are soon broken off. This precipitate forms on *P. amplifolius* even when such minute traces of lime are present that other species show no evidences of it.

Although for its typical development this species prefers the deeper water, whenever its rhizomes creep up onto the muddy banks, terrestrial forms are produced. These are always sterile.

The variety *ovalifolius* that Bennett credits to Morong is presumably a state of *P. amplifolius*, but the meager description sounds suspiciously like *P. pulcher.* In view of the fact that Bennett reports *P. amplifolius* from Arkansas and from Florida[1], where it is not found, and *P. pulcher* from Maine[2] where it does

[1] Arthur Bennett, Journ. Bot. 42: 77 (1904).
[2] ————————, Journ. Bot. 40: 146 (1902).

not seem to be, it is possible that he had the identities of these plants reversed. His forma *amphibius* is based in part on remarks of Morong[1], which definitely refer to *P. pulcher*. Graebner evidently copied Bennett's names and descriptions without any inquiry as to upon what they were based.

[1] Thomas Morong, Mem. Torr. Club. 3: no. 2: 17 (1893).

(*To be continued*)

THE BROAD-LEAVED SPECIES OF POTAMOGETON OF NORTH AMERICA NORTH OF MEXICO

E. C. Ogden

(*Continued from page 105*)

5. P. pulcher Tuckerman

Rhizome buff, often with dark red spots, .5–1 mm. in diameter. Stem simple, terete, 1–2.5 mm. in diameter, usually con-

spicuously black-spotted; stele with the proto-type pattern; endodermis of O-cells; interlacunar and subepidermal bundles absent; pseudo-hypodermis 1 cell thick. Submersed Leaves (excluding transition leaves) of two more or less distinct types, those of the lower part of the stem semi-opaque, oblong with rounded apices; those of the upper part of the stem translucent, lanceolate to lance-linear, not arcuate, apex acutish but not sharp-pointed, both types tapering at base to short petioles (up to 1.5 cm. long) or sometimes practically sessile; blades 8–14 (–18) cm. long, 1–2.5 (–3.5) cm. wide, nerves (9–) 11–21, outer ones marginal; margins entire; lacunae 4–8 rows each side of midrib. Floating Leaves coriaceous, ovate to rotund; apex rounded or bluntly mucronate; base cordate or rounded; petioles 4–18 cm. long; blades 2–7 (–11) cm. long, 1.5–4 (–8.5) cm. wide, with (19–) 21–29 (–35) nerves, all of about equal prominence, as seen by transmitted light; lacunae none or very faint. Stipules of the submersed leaves decaying early, those of the floating leaves persistent, narrowly triangular, obtuse when young, becoming acutish with age, 2–5 cm. long, 2-keeled. Peduncles of rather even thickness throughout, 5–8 (–11) cm. long. Spikes with about 10 whorls, in fruit 2–3.5 cm. long, .8–1.1 cm. thick. Flowers sessile or nearly so; sepaloid connectives usually with a greenish cast, blades orbicular to elliptical, (1.2–) 1.5–2.5 (–3) mm. wide, claws, .4–.8 mm. long; anthers .8–1.4 mm. long. Fruits obliquely ovate, rounded or cuneate at base, sides flat or slightly concave, (2.7–) 3–3.5 (–4) mm. long, (2.3–) 2.6–3.2 (–3.4) mm. wide; beak often prominent, up to .8 mm. long; keels usually prominent, acutish, the dorsal one often strongly developed, and sometimes with a basal lobe projecting below the point of attachment; exocarp mostly light brown, sometimes olive-green; endocarp with 3 prominent, acutish and somewhat muricate keels, beak linear, facial, about 1 mm. long, loop solid; apex of seed pointing .5–1.2 mm. above the basal end. Plants characterized by a conspicuously spotted stem, with large cordate floating leaves and lanceolate submersed leaves which taper rather abruptly to the base.

P. pulcher Tuckerm., Am. Journ. Sci. ser. 1: **45:** 38 (1843); Morong, Mem. Torr. Club **3:** no. 2: 16 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 67 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 21 (1909); Hagstr., Crit. Res. Pot. 152 (1916). *P. natans* sensu Bigel., Fl. Bost. 41 (1814), according to Tuckerm., Am. Journ. Sci. ser. 1: **45:** 38 (1843). *P. lucens* var. ? *fluitans* (Roth) Gray, Man. ed. 2: 435 (1856), as to plants included in part, not *P. fluitans* Roth. *?P. amplifolius* forma *amphibius* Benn., Journ. Bot. **42:** 70 (1904). *?P. amplifolius* var. *ovalifolius* Morong ex Benn., Journ. Bot. **42:** 70 (1904); ?Graebn. in Engler, Pflanzenr. **4:** fam. 11: 68 (1907). *?P. amplifolius* var. *amphibius* (Benn.)

Graebn. in Engler, Pflanzenr. **4:** fam. 11: 68 (1907). *Spirillus pulcher* Nieuwl., Am. Mid. Nat. **3:** 16 (1913). *P. pulcher* forma *amphibius* Hagstr., Crit. Res. Pot. 153 (1916).

Shallow muddy pools, peaty pond-holes and sluggish streams chiefly of the Coastal Plain and Mississippi embayment, southern Nova Scotia, southern New Hampshire, south to Georgia, Texas, Oklahoma, Arkansas, Missouri and Minnesota. Map 6. The following, selected from many specimens, are referred here. Nova Scotia: Sears L., New Tusket, Digby Co., *Fernald & Long 23137;* Rhodeniser L., e. of Bridgewater, Lunenburg Co., *Fernald & Long 23138.* New Hampshire: Contoocook R., E. Jaffrey, *Rand & Robinson 1013.* Massachusetts: Foster's Pond, Andover, Essex Co., *Pease 2011;* Waushakum P., Ashland, Middlesex Co., June 1879, July 1, 1881, July 5, 1882 & Aug. 7, 1882, *Morong;* Spot P., Stoneham, July 4, 1852, *Robbins;* Whitman P., Weymouth, Norfolk Co., *Seymour 4151;* Sampson's P., Carver, Plymouth Co., *Fernald 750;* Uncatena, Elizabeth Islands, Dukes Co., *Fogg 2997;* L. Neeseponset, Dana, Worcester Co., *Goodale, Markert & Piper 96988;* Readville, Suffolk Co., June 16, 1878 & June 16, 1880, *C. E. Faxon,* also June 23, 1879, *Morong;* Natick, June 1, 1881 & Sept. 27, 1881, *Morong;* Nantucket, Nantucket Co., July 1887, *Morong.* Rhode Island: ponds between Pilot Hill and Southeast Point, Block Island, Newport Co., *Fernald, Hunnewell & Long 8443;* Apponaug P., Apponaug, Aug. 26, 1880, *Morong.* Connecticut: Fairfield, *E. H. Eames 8740 & 8746;* Killingworth, Middlesex Co., Aug. 19, 1915, *C. H. Bissell.* New York: River Head, Wading R., Long Island, May 25, 1878, *E. S. Miller;* Long Island, May 1890, *F. N. Tillinghast;* Valley Stream, Queens Co., Long Island, July 1886, *J. A. Bisky;* Arden, Staten Island, Oct. 9, 1886, *A. Hollick;* Rockland L., July 17, 1872, *Morong.* New Jersey: Molly Wheaton Run, e. of Greenwich, Cumberland Co., *Fogg 2077;* Elmer, Salem Co., *Redfield 7996;* Cape May Court House, *Killip 30845;* Atlantic City, July 5, 1868, *C. F. Parker.* Pennsylvania: Tullytown, Bucks Co., May 24, 1930, *W. M. Benner.* Delaware: Record's P., Laurel, Sussex Co., *Fogg 1840;* Glendaniel (Hudson) P., 2 mi. s. of Lincoln, Sussex Co., *Fogg 4504;* Indian R., Millsboro, Sussex Co., May 23, 1876, *A. Commons;* cedar swamp, New Castle Co., Sept. 20, 1867, *Commons;* Cherry Island Marsh, below Edgmoor, Wilmington, July 27, 1896, *Commons;* Canterbury, July 1874, *Wm. M. Canby.* Maryland: Marshyhope Creek, Federalsburg, Caroline Co., *Shreve 1622;* Blackwater R., Dorchester Co., *Shreve 1597;* Willards, Wicomico Co., Aug. 12, 1910, *J. J. Carter.* Virginia: 4 miles n. w. of Waverly, Sussex Co., *Fernald & Long 5977;* brook entering Nowney Creek, Back Bay, Princess Anne Co., *Fernald, Griscom & Long 4535;* near Cornland, Norfolk Co., *Fernald & Griscom 4295;* pond near Luray Caverns, Luray,

June 1, 1909, *E. B. Bartram;* near Elko, *Grimes 4196;* vicinity of Cape Henry, *Killip 6896;* Great Dismal Swamp, *Kearney 1626;* Washington Canal, Dismal Swamp, *Boettcher 9;* Dahlia, Greensville Co., *Fernald & Long 8538.* North Carolina: Cape Fear R., Wilmington, herb. *Hexamer & Maier 466;* Hendersonville, Henderson Co., *Biltmore Herb., 5980*[a]. Georgia: near Huguenin, Sumter Co., *Harper 1402;* Brier Creek, Screven Co., *Harper 2088.* Florida: Miccosukee L., *Sperry 509.* Ohio: Baumgartner's L., Jackson Twp., Franklin Co., Aug. 16, 1929, *H. T. Flint.* Indiana: pond about 3½ mi. n. w. of Grayville, Sullivan Co., *Deam 25704;* Pine Station, Lake Co., June 1884, *E. J. Hill;* Pine, Lake Co., June 21, 1897, *A. M. Chase.* Kentucky: Lexington, 1836, *C. W. Short;* s. e. of Mammouth Cave, Edmonson Co., *Svenson 156.* Tennessee: Goose P., Pelham, Grundy Co., *Svenson 9108 & 10150.* Alabama: Montgomery, Oct. 16, 1888, *Chas. Mohr;* slough along main highway 5 mi. w. of Tuscaloosa, Tuscaloosa Co., *Svenson 9427.* Illinois: Mason Co., Aug. 1860 & Aug. 1861, *E. Hall;* Athens, Menard Co., 1861, *E. Hall.* Minnesota: Colby L., Taylors Falls, *Metcalf 1291.* Missouri: St. Louis, 1838, *N. Riehl,* also Aug. 1847, *Geo. Engelmann;* Montier, June 8, 1890, *Bush;* north of Flatwoods, Ripley Co., *Steyermark 14245;* Little Black River, Pleasant Grove, Ripley Co., *Mackenzie 359;* between Gladden & Timber, Dent Co., *Palmer & Steyermark 41417;* Hogan, Iron Co., July 15, 1898, *C. Russell;* Nettleton, Caldwell Co., May 7, 1893, *H. Eggert* (M, mixed with *P. amplifolius;* F, NY, US, not mixed). Arkansas: Nettleton, Craighead Co., May 7, 1893, *Eggert;* Greene Co., May 7, 1893, *Eggert;* Judsonia, June 13, 1877, *H. S. Reynolds.* Louisiana: Calcasieu R., St. Martinville, Oct. 7, 1893, *A. B. Langlois* (US). Oklahoma: Page, Leflore Co., *Blakley 1453,* also *E. J. Palmer 33310.* Texas: Lindale, April 23, 1901, *Reverchon* (M).

Tuckerman's original description of *P. pulcher* is brief but leaves little doubt as to what plant he referred to this species. He was certainly in error however, when he stated that it has "much larger seeds" than *P. praelongus.* He was quite familiar with the *P. praelongus* of Fresh Pond, Cambridge, where it grew abundantly and was collected there by Boott, Tuckerman, Robbins, Morong, and the Faxons. However, all of the Fresh Pond material of *P. praelongus* seen by me lacks mature fruits, and it may be that Tuckerman did not at that time realize how large the mature fruits of that species really are. His supplementary description[1] is absolutely conclusive as to the plant he was describing.

[1] Edward Tuckerman, Am. Journ. Sci. ser. 2: 6: 224 (1848).

The forma *amphibius* and var. *ovalifolius* which Bennett referred to *P. amplifolius* may possibly be *P. pulcher*. They have been discussed under *P. amplifolius*. Hagström's forma *amphibius* is the terrestrial state so common to *P. pulcher*.

6. P. NODOSUS Poiret

RHIZOME white, suffused or spotted with rusty red. STEM simple, terete, often pressing very flat, 1–1.5 (-2) mm. in diameter; stele with the trio-type pattern, with the phloem on the inner face of the trio-bundle appearing as one patch; endodermis of O-cells (rarely more thickened on the inner face and appearing as U-cells); interlacunar and subepidermal bundles absent; pseudo-hypodermis absent. SUBMERSED LEAVES thin, linear-lanceolate to broadly lance-elliptical, 9–20 cm. long, 1–3.5 cm. wide, tapering gradually at base into a petiole 2–13 cm. long, tapering gradually to an acutish (but not sharp pointed) apex; nerves 7–15; lacunae of 2–5 rows along the midrib; margin of young blades with fugacious translucent denticles. FLOATING LEAVES coriaceous, with long petioles; blades lenticular to elliptical, cuneate or somewhat rounded at base, apex acutish to rounded (sometimes with an obtuse mucro), (3–) 5–9 (–11) cm. long, (1.5–) 2–4 (–4.5) cm. wide; nerves (9–) 13–21; lacunae rarely present. STIPULES of submersed leaves brownish, often delicate and decaying early, linear, acute or obtuse, 3–6 (–9) cm. long; those of the floating leaves similar but usually broader at base and more or less 2-keeled. PEDUNCLES usually thicker than the stem, 1.5–2.3 mm. in diameter, 3–15 cm. long. Young SPIKES compact but becoming loose at anthesis, of 10–15 (–17) whorls of flowers; at maturity usually not densely fruited, 3–6 (–7) cm. long, .8–1 cm. thick. FLOWERS sessile; sepaloid connectives greenish or brownish, orbicular or elliptical, (1.4–) 1.6–2.2 (to 2.6 on basal flowers) wide; anthers 1–1.4 mm. long. FRUITS obovate, 3.5–4 (–4.3) mm. long, 2.5–3 mm. wide; keels prominent, the dorsal strongly developed, especially upward, the laterals often muricate; beak facial, short; exocarp of mature fruits brownish or reddish; endocarp with keels strongly developed, dorsal often .5 mm. wide, the laterals strongly muricate, beak linear, erect, up to 1 mm. long, loop solid; apex of seed pointing a little above the basal end.—A variable species characterized by floating leaves cuneate at base, narrowly lanceolate submersed leaves tapering gradually to each end, and reddish fruits with strongly developed, often muricate, keels.

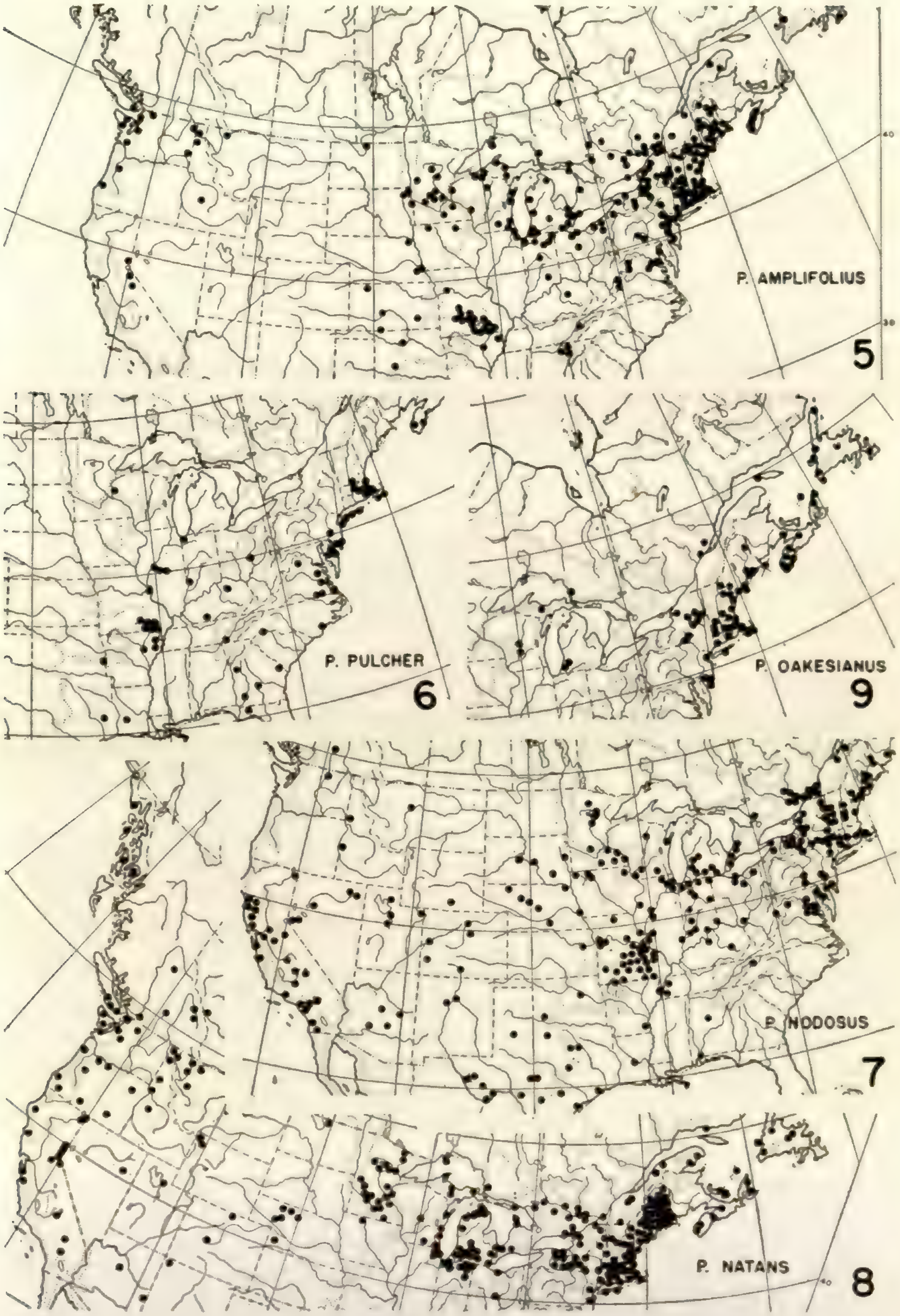
P. nodosus Poiret in Lamarck, Enc. Meth. Bot., Suppl. **4:** 535 (1816); Hagstr. Crit. Res. Pot. 183 (1916). *P. americanus* C. & S., Linnaea **2:** 226 (1827); Benn., Journ. Bot. **31:** 297 (1893); Taylor, N. Am. Fl. **17:** pt. 1: 19 (1909). *P. occidentalis* Sieber

ex C. & S., Linnaea **2:** 224 (1827); Taylor, N. Am. Fl. **17:** pt. 1: 20 (1909). *?P. montanus* Presl, Rel. Haenk. **2:** 85 (1835). *P. natans* var. *fluitans* sensu Torr. Fl. N. Y. **2:** 244 (1843). *P. lonchites* sensu Tuckerm., Am. Journ. Sci. ser. 2: **7:** 350 (1849), and subsequent Am. authors, not Tuckerm., ibid. ser. 2: **6:** 226 (1848). *P. lucens* var. ? *fluitans* (Roth) Gray, Man. ed. 2: 435 (1856), in part. *?P. plantagineus* var. *jamaicensis* Grisebach, Fl. Brit. W. Ind. 506 (1861). *?P. mexicanus* Benn., Journ. Bot. **25:** 289 (1887); ? Morong, Mem. Torr. Club **3:** no. 2: 22 (1893); ? Raunk., Bot. Tidskr. **25:** 266 (1903); ? Graebn. in Engler, Pflanzenr. **4:** fam. 11: 57 (1907); ? Taylor, N. Am. Fl. **17:** pt. 1: 18 (1909). *P. lonchites* var. *novaeboracensis* Morong, Mem. Torr. Club **3:** no. 2: 20 (1893). *P. americanus* var. *novaeboracensis* (Morong) Benn., Journ. Bot. **31:** 297 (1893). *P. pennsylvanicus* var. *portoricensis* Graebn. in Urban, Symb. Antill. **4:** 73 (1903), at least in part. *P. Nuttallii* var. *portoricensis* Graebn. in Engler, Pflanzenr. **4:** fam. 11: 56 (1907), at least in part. *P. fluitans* subsp. *americanus* (C. & S.) Graebn. in Engler, Pflanzenr. **4:** fam. 11: 60 (1907). *P. fluitans* subsp. *americanus* proles *novaeboracensis* (Morong) Graebn. in Engler, Pflanzenr. **4:** fam. 11: 62 (1907). *?P. coloratus* var. *jamaicensis* (Griseb.) Graebn. in Engler, Pflanzenr. **4:** fam. 11: 69 (1907). *?P. insulanus* Hagstr., Crit. Res. Pot. 154 (1916). *P. rotundatus* Hagstr., Crit. Res. Pot. 153 (1916). *P. fluitans* sensu Am. authors, ? not Roth, Tent. Fl. Germ. **1:** 72 (1788). *Spirillus lonchites* (Tuckerm.) Nieuwl., Am. Mid. Nat. **3:** 16 (1913).

A widespread species of ponds and streams, generally in flowing water, southern Quebec and New Brunswick to southern British Columbia, south to Virginia, Tennessee, Louisiana, and California. Map 7. Mexico and the West Indies, South America (rare), Eurasia, Africa. The following, selected from a large series, are representative: Quebec: St. Lawrence River, St. Jean-Port-Joli, L'Islet Co., *Svenson & Fassett 934;* Saint-Lambert de Lauzon, Levis Co., *Victorin, Rolland & Meilleur 43858;* Sainte-Rose, Laval Co., *Victorin & Rolland 43565 & 49304,* also *St. Cyr 3030;* Longueuil, Chambly Co., *Rolland 43359;* Angers, Ottawa R., *Rolland 19269;* Wakefield, *John Macoun 62015 & 62016;* Sainte-Sulpice, L'Assomption Co., *Ricard & Boivin 342.* New Brunswick: St. John R., Lincoln, Sunbury Co., *Fassett 2149.* Maine: Houlton, Aroostook Co., Aug. 26, 1897, *Fernald;* Pushaw Stream, Old Town, Penobscot Co., *Ogden, Steinmetz & Prince 1596,* also *Steinmetz 326.* Androscoggin R., Gilead, Oxford Co., Oct. 1, 1897, *Furbish;* Sydney, Kennebec Co., *Fernald & Long 12389;* St. George R. near Indian Garden, Warren, Knox Co., Aug. 15, 1913, *Norton.* New Hampshire: Connecticut R., vicinity of Hanover, Grafton Co., Aug. 17, 1876, *H. G. Jesup;* Cornish, Sept. 2, 1886, *F. H. Knowlton.* Vermont: Ferrisburg

and Vergennes, many collectors; Lake Champlain, Orwell, Addison Co., *Cushman 6007;* Hydeville, Rutland Co., July 21, 1892, *Eggleston;* Winooski R., Burlington, Aug. 25 & 27, 1885, *Morong.* MASSACHUSETTS: Concord, Aug. 12, 1887, *E. S. Hoar;* Mystic P., Oct. 1, 1865, herb. *Wm. Boott;* Winchester, Sept. 1, 1880, Aug. 8 and Aug. 29, 1881, *Morong* (the latter mixed with *P. nodosus* × *epihydrus* in Gray Herb.); Connecticut R., Springfield, Sept. 6, 1864, *Robbins;* Harmon P., Sheffield, Berkshire Co., Aug. 12, 1914, *R. Hoffmann;* Pauls Bridge, Neponset R., Readville, May 30, 1881, herb. *E. & C. E. Faxon;* Egremont, *Standley & Killip 7649.* CONNECTICUT: New Hartford, *Driggs 40;* Twin Lakes Station, Salisbury, Litchfield Co., Aug. 20, 1935, *Fernald & Ogden;* Lake Whitney, New Haven, Sept. 24, 1886, *W. A. Setchell;* Housatonic R., Stratford, 1845, *Robbins;* Housatonic R., Newtown, Fairfield Co., *A. E. Blewitt 3657.* NEW YORK: N. Beaver Creek, Haynes Hill, W. Fort Ann, Washington Co., Aug. 26, 1914, *Burnham;* Guildenland, Albany Co., *House 21774 & 22044;* Ellisburg, Jefferson Co., *House 19852 & 20002;* Ithaca, Tompkins Co., *R. Hitchcock 11167 & 11168;* Lake Erie, Buffalo, Aug. 20 & 25, 1886, *Morong;* Niagara Rapids, *E. Tuckerman* (*P. lonchites* of Tuckerman's supplementary description, but not of original description); pool near White Creek, DeKalb Co., *Phelps 1091;* Grass R., Canton, *Phelps 1665;* Raquette R., above Potsdam, St. Lawrence Co., *Muenscher & Clausen 3751 & 3752;* Float Bridge, Rochester, *Baxter 5389;* Chemung R., Chemung Co., *Lucy 424 & 10816.* NEW JERSEY: Oldmans Creek, 1.5 mi. n. n. e. of Eldridges Hill, Salem Co., *Fogg 6794.* PENNSYLVANIA: Harrisburg, Sept. 1893, *John K. Small;* Penn's Creek at the "Swinging Bridge," Selinsgrove, Snyder Co., *Moldenke 4208;* Sellersville, 1868, *C. D. Fretz;* vicinity of McCalls Ferry, York Co., *Rose & Painter 8205;* Chester Co., July 1858–1864, *S. P. Sharples 303.* DELAWARE: Shelpot Creek, Wilmington, June 17, 1879, *A. Commons;* Brandywine, Wilmington, Aug. 17, 1896, *A. Commons;* White Clay Creek, Stanton, Sept. 4, 1896, *A. Commons.* MARYLAND: Chicomuxen Creek, *Tidestrom 7637;* Mill Creek, Chesapeake Bay region, *Shull 95;* Cabin John, Montgomery Co., *Painter 1189,* also *Dowell & Painter 5385;* Chesapeake Canal above Cabin John, near Lock 13, *Leonard & Killip 603;* Spesutie Island, Harford Co., *Moldenke 9396;* Great Falls, *House 517.* DISTRICT OF COLUMBIA: Arlington Junction, Sept. 28, 1897, *E. S. Steele;* C. & O. Canal above Georgetown, Aug. 9, 1897, *T. H. Kearney;* Georgetown, *Van Eseltine & Moseley 202;* Fish Ponds, *Shull 39.* WEST VIRGINIA: Cacapon R., Hardy Co., Aug. 13, 1930, *W. V. U. Bot. Exped.;* Tygart R., Beverly, Randolph Co., *Millspaugh 457.* VIRGINIA: Four-Mile Run, Chesapeake Bay region, *Shull 474;* near Leedstown, *Tidestrom 7741;* Potomac R., The Dyke, *Tidestrom 7183;* Dyke,

Fairfax Co., *Metcalf & Sperry 1622 & 1630* Hunting Creek, *McAtee 2374*. Ontario: Rideau R., at Billings Bridge, Ottawa, *Malte 118274;* Mississippi R., Galetta, Carleton Co., *Ogden & Bolan 1629 & 1630;* Chatham, *Cain 935;* Nation R., Casselman, Aug. 21, 1884, *John Macoun,* also *Malte 118275;* Nation R., Russel, *Macoun 22177;* Maitland R., Goderich, *Macoun 26839;* Golden L., Renfrew Co., *Macoun 22177,* Dunnville, *John Macoun 26841;* near Lake Muskoka, Aug. 29, 1899, *D. LeRoy Topping;* L'Original, *Rouleau 304*. Michigan: Kalamazoo R., Allegan Co., *Wight 86, 87a, 87b, 87c, 88, 98 & 123;* Grand Rapids, July 21, 1895, *W. E. Mulliken;* Vandercooks L., Jackson Co., July 21, 1898, ex herb. *S. H. & D. R. Camp;* Pine L., Aug. 20, 1892, *C. F. Wheeler;* Gun R., Barry Co., July 1926, *Oosting;* Freemont L., Newaygo Co., July 9, 1926, *Oosting;* Black L., Ottawa Co., Aug. 27, 1926, *Oosting;* Huron R., 3½ mi. s. e. of Ann Arbor, Washtenaw Co., *Hermann 9383*. Ohio: Brady L., Portage Co., July 29, 1913, *R. J. Webb;* Put-in-Bay, Aug. 1898, *A. J. Pieters;* Presque Isle Point, Sandusky Bay, Aug. 19 & 29, 1895, *E. L. Moseley;* Buckeye Creek, Liberty Twp., Jackson Co., *Pontius & Bartley 18*. Indiana: Walnut Creek, 2 mi. n. e. of Bainbridge, Putnam Co., *E. J. Grimes 594;* Aberdeen, Ohio Co., *Deam 56783;* Lake Maxinkuckee, *Scovell 32;* Tippecanoe R., 6 mi. n. and 1 mi. e. of Winemac, Pulaski Co., *Welch 2106;* Calumet R., Clarke, *Lansing 1059;* n. of Spencer, Owen Co., *Deam 38978;* mouth of John's Creek, Wells Co., July 2, 1905, *Deam.* Kentucky: 3 mi. s. of Richmond, Madison Co., *Svenson 7216;* Kentucky R., June–July, *Dr. Short;* Ohio R., Louisville, Sept. 16, 1854, *C. Mohr*. Tennessee: n. fork of Holston R., near Kingsport, Hawkins Co., *Sharp & Underwood 33521;* Reelfoot L., Lake Co., *Demaree 7051 & 7132*. Alabama: Mobile R. near Piute Island, May 28 & July, 1884, *Chas. Mohr;* East L., near Birmingham, Jefferson Co., *Biltmore Herb. 5806*[b]. Wisconsin: between Duck Creek R. and Bars Channel, Green Bay, July 28, 1891, *Schuette;* Wisconsin R., near Newport, Delton, Sauk Co., Aug. 26, 1906, *A. B. Stout;* Pickerel Slough, Prairie du Chien, Crawford Co., *Fassett 4350;* Lake Mendota, Middleton, Dane Co., *Fassett 3148;* near Tomahawk, *Cheney 1086*. Illinois: Calumet L., Chicago, *Chase 1420;* Wolf L., Chicago, June 10, 1911, *Sherff;* Du Page R., Naperville, June 22, 1895, *L. M. Umbach;* Ogden Ditch, Summit, *Hill 159, 1909;* Lyons Twp., Cook Co., *Hill 151, 1901;* Fox R., Richland Co., *Ridgway 3318;* Lake Lawrence, Lawrence, *Ridgway & Eaton 3425;* Swan L., near Grafton, Calhoun Co., *Metcalf 1105;* Oquawka, 1879, *H. N. Patterson*. Minnesota: Wabana L., Itasca Co., *Metcalf 1471,* also *Kubichek 148 & 149;* Borden L., Garrison Twp., Crow Wing Co., *Hotchkiss & Jones 480 & 4109;* Ft. Snelling, June 1895, *E. P. Sheldon,* also *Mearns 805;* Minn. R. bottoms, Dakota



RANGES OF POTAMOGETON

Co., June 1895, *E. P. Sheldon;* Green L., Kandiyohi Co., *Metcalf 2046;* Mazaska L., Rice Co., *Keck & Stilwill 401;* Courtland, Nicollet Co.. July 1892, *C. A. Ballard.* Iowa: Fayette, July 1893, *B. Fink;* Estherville, Aug. 7, 1897, *R. I. Cratty;* Granite, Lyon Co., Aug. 4, 1896, *B. Shimek;* Des Moines R., July 1881, *R. I. Cratty.* Missouri: along Current R., near Doniphan, Ripley Co., *Steyermark 9233, 14257 & 14259;* Gasconade R., s. e. of Hazel Green, Pulaski Co., *Steyermark 25102 & 25103;* n. w. of Waynesville, Pulaski Co., *Steyermark 25249;* Gasconade R., n. e. of Vienna, Maries Co., *Steyermark 25603;* Buffalo Creek, s. e. of Louisiana, Pike Co., *Steyermark 25876;* Sect. 6, w. of Lynchburg, Laclede Co., *Steyermark 27148;* Osage R., Mary's Home, Miller Co., *Steyermark 13083 & 13097;* Iron Mountain L., *Metcalf 842;* Killarney L., East Arcadia, *Metcalf 845;* Ice P., Unionville, *Metcalf 1071;* Duck L., Platte Co., *Metcalf 1024;* Goose P., Springfield, *Standley 9780;* Gascondy. *Emig 224;* e. of Ashland, Boone Co., *Drouet 3028;* n. w. of Joplin, Jasper Co., *Palmer 21526;* Meramec, Sept. 2, 1886, *Eggert;* Meramec R., St. Louis Co., Sept. 12, 1886, *Eggert;* Atherton, Jackson Co., *Bush 630;* Sheffield, Jackson Co., Aug. 4, 1896, *Mackenzie;* White R., Forsythe, Taney Co., *Trelease 817.* Arkansas: Big L., Hornersville, *Metcalf 636;* Saline R., Ozment Bluff, Drew Co., *Demaree 17893.* South Dakota: Sioux R., near Brookings, Sept. 1, 1893, *T. A. Williams;* Medicine Creek, near Canning, Aug. 16, 1892, *T. A. Williams 1;* s. of St. Pierre, Stanley Co., *Over 17432.* Nebraska: Niobrara R., southwest of Valentine, *Tolstead 637;* Middle Loup R., near Norway, Thomas Co., *Rydberg 1421;* Anselmo, July 6, 1889, *Weber 6;* Lake Manawa, near Omaha, *Lawton 50.* Kansas: Topeka, Aug. 1870, *E. Hall.* Oklahoma: near Cache, Comanche Co., *Stevens 1364* (G, US, mixed with *P. amplifolius*, NY, not mixed); Sapulpa, *Bush 1207.* Texas: Comanche Spring, New Braunfels, *Lindheimer 1234;* Little Aguja Canyon, Jeff Davis Co., *Moore & Steyermark 3077;* Haley Ranch, Brewster, *Cory 9198;* Victoria, *Lindheimer 393;* Lake Polk, near Temple, Bell Co., *Wolff 3290;* Dallas, June 25, 1929, *Mary R. Stephenson;* Lubbock, *Reed 3168;* Nueces R., Uvalde, Uvalde Co., *Palmer 33707;* Houston, Harris Co., *Palmer 11952;* Sycamore Creek, Fort Worth, *Ruth 141.* Montana: Great Falls, *R. S. Williams 285.* Idaho: Payette, *Henderson 4882.* Wyoming: Ft. Steele, Carbon Co., *Goodding 539.* Colorado: Lee's L., *Crandall 2530;* Alamosa, *Clements 305;* Rio Grande, Alamosa, *Shear 3745;* Owen's L., Boulder, *Daniels 683;* Gunnison R., Grand Junction, Mesa Co., *Biltmore Herb. 5806*[a]. Utah: Hills Park, Salt Lake City, June 29, 1908, *Mrs. J. Clemens;* Hill Creek, Uinta Basin, Uinta Co., *Graham 9821;* near Goshen's fixed sand-dunes, Utah Co., *Garrett 3958;* Corinne, *Wetmore 395.* Nevada: Hot Creek, near Gold Creek, Elko Co., *P. B. Kennedy*

4476; Glendale, Truckee valley, Washoe Co., *P. B. Kennedy 3041;* Sparks, near Reno, *A. E. Hitchcock 444;* North Fork, *A. E. Hitchcock 1034;* Wadsworth, *Tidestrom 10655.* NEW MEXICO: Santa Fe, *Fendler 837;* San Jose, near Santa Fe, *Arsène & Benedict 16636;* Albuquerque, Oct. 13, 1894, *C. L. Herrick.* ARIZONA: Camp Verde, *W. W. Jones 432;* Lower Oak Creek, *Fulton 9703;* Granite Reef Dam, Maricopa Co., *Peebles 14190;* Pinal Creek, *Toumey 496;* Beaver Creek, *MacDougal 543.* CALIFORNIA: Pit R., at Lookout, Modoc Co., Aug. 24, 1899, *M. S. Baker;* Big R., Mendocino Co., *McMurphy 192;* Russian R., n. of Cloverdale, Mendocino Co., *Heller 5824;* Mormon Creek, Tuolumne Co., *Williamson 309;* Santa Cruz, *M. E. Jones 2310;* Visalia, Tulare Co., *Coville & Funston 1278;* Bakersfield, Kern Co., *Coville & Funston 1244;* Laguna Lakes, Orange Co., *Street & Williams, 2689;* Colton, San Bernardino Co., *Parish 2106 & 2128;* Deep Creek, San Bernardino Mts., San Bernardino Co., *L. C. Wheeler 1974.* WASHINGTON: Okanogan R., *Sereno Watson 398.* BRITISH COLUMBIA: Kamloops, June 26, 1889, *John Macoun 2970.*

P. fluitans of European authors consists of two quite independent plants: one a fruiting plant with an endodermis of O-cells and no bundles in the cortex; this occurs in North America. The other is a sterile plant with an endodermis of U-cells and with numerous bundles in the cortex; this plant is thought to be a hybrid, *P. lucens* × *P. natans.* Roth's original description,

> P. foliis inferioribus longissimis, lanceolatis, acuminatis, membranaceis; superioribus ouali-lanceolatis, coriaceis: omnibus petiolatis.
> Habitat in fossis profundis lente fluentibus et in *Hunte* fluuio *Ducatus Oldenburgensis,*

would include both plants. The fact that no fruits are described does not at all mean that Roth's plant lacked them, for at that time vegetative characters were given prominence and the fruits often ignored. Of the thirteen species of *Potamogeton* described in Roth's flora where *fluitans* is proposed as new, not one of them has any mention of fruit. Even if Roth's specimens lacked fruit, it does not follow that they were the non-fruiting entity with bundles in the cortex. Bennett thought the name *fluitans* ought to be kept for the hybrid, saying, "We have no certain knowledge of any specimen of Roth's species being preserved in any herbarium; but there are at Munich specimens in Schreber's herbarium, named as such and gathered 'In Seebach, 1775,' and others, 'In Seebach, 1782.' It seems to me a reason-

able inference that these specimens are from (or seen by) Roth; the more so because there are other species in the same collection actually received from Roth, and signed by him. They are the plant we call *fluitans* in England (hybrid?)"[1]. Later he adds, "The following extract from Roth's *Catalecta Botanica* (fasc. 1, p. 31, 1797) will show that Schreber's specimens in the Munich Herbarium are, as I supposed, the plant of Roth: . . . 'Prope *Erlangam* etiam observavit Ill. Praes. *de Schreber*'"[2]. To this Raunkiaer answers, "that because a herbarium contains plants actually from Roth it can not be necessary that other plants in the same herbarium should be from him. The specimens from the Munich herbarium mentioned have been examined by me and that they belong to the barren form of *P. fluitans* is true enough but they can not in the least be considered original specimens."[3] He then attempts to show that in the Bremen herbarium there is a specimen which has a good chance of being the original; and it is the plant with O-endodermis and lacking bundles in the cortex. He also states that in the "Petersburg herbarium and examined by me . . . three specimens . . . may well be original specimens."[4] As these specimens also proved to be the fertile plant he concludes that we should retain the name *P. fluitans* for the fertile species which lacks strengthening tissue in the cortex. Hagström agrees that "This proof would be very strong, if those specimens examined also really corresponded with the original description by Roth 'foliis inferioribus longissimis' . . . which they can scarcely be said to do."[5] From Roth's later and more detailed description[6] it does appear that he then was at least including the barren form with his *P. fluitans*. Also, it would seem, if Roth had in mind the specimens in the Bremen and Petersburg herbaria when drawing up his original description, that he would have mentioned them in his Catalecta Botanica, as he does mention the Schreber specimens. It thus appears that the evidence that *P. fluitans* should be retained for the fruiting plant is not strong, and I am

[1] Arthur Bennett, Journ. Bot. **31**: 296 (1893).
[2] ————, Journ. Bot. **39**: 198 (1901).
[3] C. Raunkiaer, Bot. Tidskr. **25**: 278 (1903).
[4] ————, Bot. Tidskr. **25**: 278 (1903).
[5] J. O. Hagström, Crit. Res. Pot. 184 (1916).
[6] A. G. Roth, Tent. Fl. Germ. **2**: 202 (1789).

inclined to agree with Hagström in treating it as a *nomen confusum*. Hagström takes up for this plant *P. nodosus* Poiret.

P. nodosus Poiret is based on a plant from the Canary Islands, collected by Broussonet. This specimen should be in the Paris Museum. A photograph of it was, some years ago, requested by the Gray Herbarium but not received. The original description agrees with the specimens here placed under that name, but is not conclusive. Until it can be shown that the Canary Island plant is not the wide-ranging species correlated with it, it is best to retain Poiret's name, as taken up by Hagström, for the American plant.

The species in North America is a rather variable one. The floating leaves especially vary greatly in size. Morong's var. *novaeboracensis* (of *P. lonchites*) covers the large-leaved form, which in America is less frequent than the narrow-leaved form. In Europe the broad-leaved plants are the more common. Which form is represented by the Broussonet specimen I am at present unable to say, but at any rate this size-variation appears not to be worth nomenclatorial distinction. The robustness of the plant does not correlate with other variations and the intermediate forms are the most common. Even the fruits of this species show a diversity in the prominence of the keels, but this, too, does not correlate with other differences, and sometimes a marked variation is found on an individual plant. When typically developed, the keels are strongly prominent; their lack of development is probably mostly due to a rapid maturation—a ripening before the endocarp is fully formed. Unkeeled fruits invariably have aborted embryos.

From Missouri westward, this species tends to have smaller floating leaves of a more yellowish green than those typical of the east. Correlated with this is a smaller fruit with less strongly developed keels (*P. rotundatus* Hagstr.). However, the typical large green leaf is also common in the west, as well as all degrees of intermediate forms. Also, some specimens with small yellowish leaves may exhibit fruits as strongly keeled as those of the typical eastern plants.

In 1848, Tuckerman described as *P. lonchites* a plant with "stem . . . much branched, . . . Submersed leaves . . . with 6–8 prominent nerves," (making no mention of a

petiole) and "floating leaves delicate, . . . always more or less tapering above and waved above, . . . stipules . . . shortish . . . Nutlets small . . . obscurely tricarinate." He stated that it was "near to P. heterophyllus of authors, (P. gramineus, Fr., Koch.)."[1] The following year he remarked further on his *P. lonchites* and spoke of "a remarkable state of this species . . . In this the stem is simple . . . and the . . . leaves are either all coriaceous and floating, or only the lowest submembranaceous, . . . the whole habit of which accords, often strikingly with that of *P. fluitans;* but its strongly marked fruit at once refers it to the present species. The published description of the fruit of this species was from immature nutlets. The following is taken from perfectly ripe ones . . . The lateral keels are conspicuous when dry . . . The exocarp being removed, the back appears acutely carinate, and a little alate, especially above."[2] It is quite evident from a comparison of the two descriptions and an examination of specimens labeled "*P. lonchites*" by Tuckerman that he was dealing with two separate and distinct species. Plants in the Gray Herbarium which, though not fruiting, otherwise fit his original description perfectly and are labelled "*Potamog. lonchites*" in Tuckerman's hand, have no close relationship to the plants associated with that name by Robbins, Morong and, following them, some other American authors, but are flowing-water forms of *P. gramineus* var. *maximus*. Tuckerman's supplementary description was based on *P. nodosus*, which he mistook to be a state of his *P. lonchites*, as a specimen in the Gray Herbarium clearly shows.

P. rotundatus was based by Hagström on four specimens: one each from Nebraska, California, New Mexico and Mexico. Although referring it to the subsection *Amplifolii*, he states: "I have scarcely met with a species corresponding so nearly to *P. nodosus* as regards the stem-anatomy as this. It differs by the smooth leaf margin, the long lower petioles, the prasinous leaf-colour, the ligules, the styles, and chiefly by the characteristic fruits."[3] In the Gray Herbarium are specimens from three of the collections cited. All lack true submersed leaves. The

[1] Edward Tuckerman, Am. Journ. Sci. ser. 2: 6: 226 (1848).
[2] Edward Tuckerman, Am. Journ. Sci. ser. 2: 7: 351 (1849).
[3] J. O. Hagström, Crit. Res. Pot. 154 (1916).

Nebraska plant (*Rydberg*, no. 1421) has no fruit; the specimen from New Mexico (*Fendler*, year 1847) has fruit which is definitely keeled. The Mexican collection (*Pringle*, no. 1390) alone has the fruits as described by Hagström. That they lack keels is true enough, but that they are quite immature is also evident. Numerous specimens of *P. nodosus* show immature spikes the fruits of which vary greatly in the development of keels. As to the leaf-margin, the denticles on the submersed leaves of *P. nodosus* are so extremely fugacious that they are seldom found in any but the youngest leaves. Young leaves of plants approaching the appearance of *P. rotundatus* have denticles as freely as those of typical *P. nodosus*. The stipules ("ligules") of typical *P. nodosus* are often scarcely if at all keeled, so that the lack of keels on those of *P. rotundatus* is not sufficient for its separation.

The species proposed by Hagström as *P. insulanus* is based on a single specimen from Puerto Rico: *Sintensis*, no. 2537, in the herbarium at Stockholm. Originally identified as *P. pensylvanicus* Willd. (*P. epihydrus* Raf.) by Bennett, this collection (at least the specimen in the Berlin herbarium) became, with *Sintensis*, no. 1025, the type material upon which *P. Nuttallii* var. *portoricensis* Graebner was based. Hagström refers *Sintensis*, no. 1025 to *P. nodosus*, though saying, "dubious . . . probably . . . what I call *P. insulanus*." The two numbers before me show clearly that neither has any affinity to *P. epihydrus* (*P. pensylvanicus* or *P. Nuttallii*), as has already been pointed out by Fernald.[1] The number 1025 is rather definitely *P. nodosus*. The number 2537 in the Gray Herbarium is sterile and with small abnormally developed submersed leaves. It appears to be either an ecological form of *P. nodosus* or possibly a hybrid between *P. nodosus* and some member of the subsection *Lucentes*.

Just what *P. mexicanus* Ar. Benn. is cannot be definitely determined. Bennett's description agrees rather well with *P. nodosus*, except: "Fruit 3/16 in. long by 1/4 in. broad." However, fruits seen by Morong were described by him as being "2 lines long, 1½ lines wide,"[2] less than half as wide, so it can be concluded that Bennett's "1/4 in." is in error. Graebner, who evidently found it convenient to compute his measurements from

[1] M. L. Fernald, Mem. Am. Acad. Arts & Sci. 17: pt. 1: 119 (1932).
[2] Thomas Morong, Mem. Torr. Club 3: no. 2: 23 (1893).

Bennett's description, gives "5 mm longi et 6 mm lati."[1] Specimens in the Gray Herbarium and cited by Graebner are sterile, but referable to *P. nodosus*.

P. occidentalis, described by Chamisso and Schlechtendal and credited to Sieber, appears, from the description and excellent illustration of the fruit, to be typical *P. nodosus*.

Just what *P. plantagineus* var. *jamaicensis* Grisebach represents is not determined. From the description and judging from the plants found in Jamaica, it appears to be *P. nodosus*. Further study is needed on the subsection *Nodosi* of Central America and the West Indies.

7. P. natans Linnaeus

Rhizomes white with reddish spots when fresh, buff with dark red spots when dry (these spots often with lighter centers). Stem simple or rarely branched, terete, .8–2 mm. in diameter, with transverse ridges (these also on the rhizome and submersed leaves); stele with the trio-type pattern, the phloem on the inner face of the trio bundle appearing as 2 distinct patches; endodermis well developed, of U-cells; interlacunar and subepidermal bundles present; pseudo-hypodermis 1 cell thick. Submersed Leaves coriaceous, semi-terete, narrowly linear (excluding transition leaves), no differentiation between blade and petiole, tapering at the apex to an obtuse tip, 10–20 cm. long, .8–2 mm. wide; nerves 3–5, obscure. Floating Leaves coriaceous, with long petioles 1–2.5 mm. thick, each having a brownish curved joint-like portion at its junction with the blade; blades ovate to oblong-ovate (sometimes ovate-elliptic), cordate to rounded or rarely tapering at base, apex rounded or with an obtuse mucro, 4–9 (–12) cm. long, 2.5–6 (–6.5) cm. wide; nerves (13–) 23–37, with about one-third of them prominent; lacunae none or obscure. Stipules of submersed leaves clasping the stem, whitish, fibrous, persistent, linear to lanceolate, cucullate at apex in the bud, splitting on maturity and becoming raggedly obtuse, or twisting and becoming acutish, 4.5–9 (–11) cm. long, about 5 mm. wide at base, with 2 well-developed keels and many fine nerves; those of the floating leaves similar but usually broader (up to 12 mm. wide at base). Peduncles as thick as or slightly thicker than the stem, 3–8 cm. long. Spikes in anthesis compact, with 8–14 whorls; in fruit 3–5 cm. long, .9–1.2 cm. thick. Flowers sessile or nearly so; sepaloid connectives greenish, reniform to orbicular, (1.6–) 1.8–2.2 (–2.8) mm. wide; anthers about 1 mm. long. Fruits obovoid, (3–) 3.5–5 mm. long, 2.5–3.5 mm. wide; keels none or rounded or with dorsal keel some-

[1] P. Graebner, in Engler, Pflanzenr. 4: fam. 11: 57 (1907).

what prominent if dried before fully mature; beak short and broad; exocarp sack-like, wrinkled, bright orange drying to buff (greenish when immature); endocarp more or less pitted on each side, and with 2 longitudinal sinuses on the back forming 3 rounded keels, beak linear, about 1 mm. long, loop solid; apex of seed pointing toward the basal end. Plants mostly with strongly developed cordate floating leaves and with the narrowly linear submersed leaves decaying early.

P. natans L., Sp. Pl. **1:** 126 (1753); Morong, Bull. Torr. Club, **13:** 145 (1886), Mem. Torr. Club **3:** no. 2: 13 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 42 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 16 (1909); Hagstr., Crit. Res. Pot. 191 (1916). *P. natans* var. *prolixus*, sensu Am. authors; an Koch?

A common species of lakes and streams, Newfoundland, south to Pennsylvania, west to California, and north to southern Alaska. Map 8. Eurasia. The following, selected from a large series of specimens are representative: Newfoundland: Bishop Falls, Valley of Exploits R., *Fernald, Wiegand & Darlington 4461;* Highlands P., Crabbes, *Kennedy 80;* 4 miles northeast of Port à Port, *Mackenzie & Griscom 10043.* Quebec: Mingan Islands, Saguenay Co., *St. John 90081;* Maria, Bonaventure Co., *Victorin, Rolland & Jacques 33316;* marly pond, Grand R., Gaspé Co., *Collins, Fernald & Pease 5295;* Lac Porc-Épic, Saint-Fabien, *Rousseau 30003;* Black L., Megantic Co., *Fernald & Jackson 11986;* LacTremblant, Labelle Co., *Victorin & Rolland 44070;* Lake Memphremagog, Sargent's Bay, Aug. 1, 1903, *J. R. Churchill;* Ile Verte, Longueuil, Chambly Co., *Rolland 43363;* McGregor L., *John Macoun 85530;* North Wakefield, *J. M. Macoun 4358.* Magdalen Islands: between E. Cape & E. Point, Coffin Island, *Fernald, Long, & St. John 6763.* Prince Edward Island: east of Britain P., Kings Co., *Fernald & St. John 10894.* Nova Scotia: Pottle's L., North Sydney, Cape Breton Co., *Bissell & Linder, 19678;* west of Ingonish, Cape Breton Island, *Nichols 749;* Salmon R., Truro, Colchester Co., *Bean & White 19675;* Middleton, Annapolis Co., *Fernald & Pease 19676;* Wentworth L., Digby Co., *Fernald & Long 23130;* St. John (Wilson's) L., Yarmouth Co., *Fernald, Bartram & Long 23129;* Charcoal, valley of the East R., *St. John 1372.* Maine: Portage L., Aroostook Co., 1881, *Kate Furbish;* Great Works Stream, Clifton, Penobscot Co., *Fernald 2756;* Foxcroft, Piscataquis Co., *Fernald 475;* Baker L., T 7 R 17, Somerset Co., *St. John & Nichols 2106;* Swan P., Oxford Co., July 1892, *J. C. Parlin;* Torrey P., Deer Isle, Hancock Co., *A. F. Hill 2560a;* Stevens P., Liberty, Waldo Co., *Rossbach 60;* Black Duck P., Matinicus, Knox Co., July 13, 1919, *C. A. E. Long;* Sydney, Kennebec Co., *Fernald & Long 12381;* n. of Perley P., Sebago, Cumberland Co., *Fernald, Long & Norton 12382;* Wells, York Co.,

July 1881, *J. Blake.* New Hampshire: Cherry P., Jefferson, Coös Co., *Pease 20073;* Long (Stacy) P., Washington, Sullivan Co., *Fernald & Svenson 745;* Frost P., Jaffrey, Cheshire Co., *B. L. Robinson 494;* Derry, Rockingham Co., Aug. 3, 1926, *C. F. Batchelder;* West Lebanon, Sept. 7, 1891, *G. G. Kennedy;* Bellamy R., Madbury, Strafford Co., *Hodgdon 2640.* Vermont: Pelot's Bay, Lake Champlain, North Hero, Grand Isle Co., Aug. 2, 1899, *Nellie Flynn;* West Barnet, Caledonia Co., Aug. 20, 1884, *F. Blanchard;* Lowell L., Londonderry, Windham Co., *L. A. Wheeler;* Dead Creek, Ferrisburg, Aug. 15, 1881, *E. Faxon.* Massachusetts: Long P., Tewksbury, Middlesex Co., Aug. 24, 1865, herb. *Boott,* also *L. B. Smith 632;* Lower P., Wakefield, Middlesex Co., *Collins 937;* Plymouth, Plymouth Co., Aug. 26, 1913, *S. N. F. Sanford;* Eastham, Barnstable Co., *Collins 3171;* Sutton, Worcester Co., *Anderson, Smith & Weatherby 1166;* Robinson Creek, Pembroke, *Fernald & Svenson, Gray Exsic. 409;* Lake Buel, New Marlboro, Berkshire Co., July 20, 1920, *J. R. Churchill.* Rhode Island: Providence, July 1866, *G. Thurber.* Connecticut: Twin Lakes, Salisbury, Litchfield Co., *Eames & Godfrey 8679;* Dog P., Goshen, Litchfield, Aug. 24, 1913, *Bissell & Weatherby;* Farmington R., Hartland, Hartford Co., *Ogden & Bolan 1565;* Long P., Thompson, Windham Co., *Weatherby 4364;* Mahoney Meadow, Franklin, New London Co., July 27, 1905, *R. W. Woodward.* New York: Pierrepont P., Woodville, Jefferson Co., *House 16979;* Lake Canandaigua, Woodville, Aug. 19, 1884, *Morong;* Spencer L., Spencer, Tioga Co., *E. Moore 1488;* Tioughneoga R., Riverside Park, Cortland Co., *E. L. Palmer 37;* Carpenters P., Fabius, Onondaga Co., *House 1338;* Sodus Bay, Wayne Co., *Killip 6204 & 12258.* New Jersey: Black R., Chester, Morris Co., *Mackenzie 4377;* Swartswood L., Sussex Co., *Griscom & Mackenzie 10685.* Ontario: Ko-Ko-Ko Bay, L. Timagami, *Cain 1045;* Franks Bay, Lake Nipissing, *Chitty 260;* McKay's L., near Ottawa, *Malte 118270;* McGregor Bay, Manitoulin Dist., *Ogden & Bolan 1646;* Cypress Lake Channel, Tobermory, Bruce Co., *Krotkov 7038;* Little Eagle Harbor, Lake Huron, *John Macoun 26840;* Golden L., Renfrew Co., July 28, 1899, *L. M. Umbach;* Dumbell L., Pancake Pt., Algoma Dist., *Taylor, et al. 295.* Michigan: Isle Royale, *Cooper 260;* St. Ignace, Mackinac Co., *Pease & Ogden 24165;* Lake Charlevoix, Ironton, Charlevoix Co., *Ogden & Bolan 1676;* Bessey Creek, Cheboygan Co., *Gates 12217;* Manistee, Aug. 8, 1882, *Morong;* Pine L. near Mich. Ag. Coll., July 25, 1891, *C. F. Wheeler 7;* Thread P., Flint, Aug. 11, 1909, *Sherff;* Kimble L., Vicksburg, Kalamazoo Co., July 3, 1938, *Rapp 2238;* Barton L., Kalamazoo Co., *Hanes 1978;* Park L., Ingham Co., July 22, 1926, *Oosting.* Ohio: Buckeye L., e. of Columbus, *Morris A41;* Put-in-Bay, Aug. 1898, *A. J. Pieters.* Indiana: Wolf L., *Agnes*

Chase 1459; Wolf L., Lake Co., *Lansing 4274;* Bear L., Noble Co., *Deam 49391;* Cheeseborough L., Flint, Steuben Co., *Deam 49360;* Lake Maxinkuckee, *Evermann 1032* (US), also *Scovell & Clark 1032 (271), under direction of Evermann* (F), also *Scovell 26* (US, mixed with *P. amplifolius*). WISCONSIN: Elkhart L., Aug. 28, 1887 and Aug. 4, 1892, *F. H. Schuette;* Pell L., Bloomfield Twp., Walworth Co., *Hotchkiss & Koehler 4193;* Lauderdale, *Bebb 995 & 1008;* Valley of the Wisconsin R., near Rainbow Rapids, *Cheney 1420.* ILLINOIS: Lake Villa, Lake Co., *Gleason & Shobe 179;* Grass L., Lake Co., *Gates 1752.2;* Cedar L., 50 mi. n. of Chicago, *Roush 812;* Ringwood, *Geo. Vasey.* MINNESOTA: Lake Itasca, Clearwater Co., *Grant & Oosting 3203;* Cass L., *Pammel 100;* Minnesota R., Dakota Co., June 1895, *E. P. Sheldon;* Great Crab L., St. Louis Co., Sept. 3, 1919, *Butters;* Green L., Chisago City, *Metcalf 1295;* Swan L., Nicollet Co., *Metcalf 50;* Schultz L., Kandiyohi Co., *Metcalf 2113;* Koronis L., Stearns Co., *Metcalf 1388*, also *Kubichek 115b* (US, mixed with *P. amplifolius*); Little Pine L., Aitkin Co., *Over 17139;* Lizzie L., Ottertail Co., *Kubichek 190;* Bear L., Freeborn Co., *Shunk & Manning 83;* German L., Le Sueur Co., *Shunk & Manning 225;* Lake Charlotte, Wright Co., *Linsdale & Keck 127;* Silver L., Mille Lacs Co., Aug. 1892, *E. P. Sheldon.* IOWA: Spirit L., Dickinson Co., July 31, 1896, *B. Shimek*, also July 29, 1897, *R. I. Cratty;* Round L., Lake Twp., Clay Co., *Hayden 823.* NORTH DAKOTA: Upsilon L., Turtle Mts., St. John, Rolette Co., *Mabbott 459;* Metigoshe L., Turtle Mts., Bottineau Co., *Metcalf 544.* NEBRASKA: Hannah's L., Cherry Co., *Smith & Pound 228;* Hackberry L., Cherry Co., July 20, 1912, *Pool & Folsom*, also *Tolstead 638;* Niobrara Game Reserve, near Valentine, *Tolstead 428;* Swan L., Grant Co., *Rydberg 1652;* Shafer L., Garden Co., *Uhler & Martin 1660;* South Cody L., *Ray Thomson 232.* ALBERTA: n. of Lake Louise, Rocky Mts., *Macoun 68425* (C). MONTANA: Lake McDowell, Glacier Nat'l Park, *Maguire & Piranian 5439;* Avalanche L., Glacier Nat'l Park, *Standley 18500;* Rost L., Big Fork, *Whitford 254*, also *MacDougal 676;* Whitefish L., Aug. 24, 1892, *R. S. Williams.* IDAHO: Lake Pend Oreille, near Hope, *Sandberg, MacDougal & Heller 939;* Lake Pend Oreille, Aug. 1891, *J. B. Leiberg;* valley of Lake Tesemini, Kootenai Co., *Sandberg, MacDougal & Heller 697;* Paradise Creek, Moscow, *Henderson 2717;* Priest L., *Piper 3765*, also *MacDougal 240;* Potlatch R., Nez Perce Co., *St. John et al. 9740;* Warm L., 25 mi. n. e. of Cascade, Valley Co., *Rollins & Chambers 2590;* Fernan L., Coeur d'Alene, *Rust 385.* WYOMING: Jackson's Hole, Lincoln Co., *E. B. & Lois B. Payson 2251;* Grand Encampment, *Aven Nelson 4145.* COLORADO: Laramie R., Larimer Co., Aug. 4, 1891, *C. S. Crandall* (NY); Crested Butte, Aug. 1891, *Cal. Acad. Sci. Herb.* (S). UTAH: Weber R., *Sereno Watson 1131* (G, see also next citation). NEVADA: Ruby

L., *Sereno Watson 1131* (G, NY, US, see also previous citation). New Mexico: Long L., Chusca Mts., San Juan Co., *A. Wetmore 541* (US). Arizona: Marsh L., White Mts., *Goldman 2453* (US); Walker L., San Francisco Mts., *Knowlton 288* (US). California: Fletcher Creek at Pease Place, Devil's Garden, Modoc Co., *L. C. Wheeler 3973;* near Lassen Buttes, Plumas Co., *H. E. Brown 644;* Upper Mud L., Coal Mine Ridge, San Mateo Co., *R. S. Ferris 2043;* Mather, Tuolumne Co., *Keck 1188;* Lakeside, Eldorado Co., June, July 1912, *H. D. Geis;* Lily L., near Fallen Leaf, Lake Tahoe region, Eldorado Co., *Wiggins 6757, 6777 & 6797;* Big Lagoon, Big R., Mendocino Co., *McMurphy 193;* Bear Valley, San Bernardino Mts., *S. B. & W. F. Parish 1435.* Oregon: Salem, *Elihu Hall 486;* Sauvie's Island, Willamette, Multnomah Co., *Howell 365;* Seven Mile Creek, Klamath L., Klamath Co., *Applegate 4489;* w. fork of Illinois R., near Floyd School, Josephine Co., *Abrams 8677;* Port Orford, *Peck 8514;* Quartz Valley, *Coville & Leiberg 224 & 228;* Cape Arago, Coos Co., *House 5044.* Washington: first pond east of summit, Nespelem road, Okanogan Co., *Fiker 1455;* Oyhut, Chehalis Co., *Lamb 1259;* Nooksack R., Lummin Indian Reservation, Whatcom Co., *Muenscher 7643;* Seattle, *Piper 758.* British Columbia: Revelstoke, *John Macoun 3019;* Colquitz R., near Victoria, *John Macoun 88248;* San Juan L., Dist. of Renfrew, *Rosendahl 790;* Chilliwack Valley, *J. M. Macoun 26814;* Griffin L., *Macoun 2971* (C, mixed with *P. epihydrus* v. *Nuttallii*), also *Macoun 3020.* Alaska: Prince of Wales Island, Klawak L., *Mr. & Mrs. E. P. Walker 994;* Ketchikan, *Cowles 1405;* Dundas Bay, *J. P. Anderson 1344;* Sitka, *J. P. Anderson 21*, also *Evans 781.*

P. natans is a familiar species over all the northern half of the United States. Because of its wide range and tendency to fruit freely it is one of the primary foods for wild water-fowl.

Although the American plant seldom attains the robustness so typical of the European plant, there seem to be no characters fundamental enough to separate the two, even as varieties. The fruit of the American plant has a weaker endocarp-beak than that of the European, a fact noted for the American *P. alpinus*, but unlike the case of that plant, the drying of the mesocarp of *P. natans* does not cause any appreciable difference in the shape of the fruits on the two hemispheres. The endocarp loop is invariably solid in the American plant and sometimes shows a cavity in European specimens.

P. natans, like the other broad-leaved species, responds markedly to ecological conditions. Many of these forms have been given names. In fact, some of the names on the labels for

the European plants make habitat-notes quite superfluous. When in quiet water, the floating leaf-blades become broad and definitely cordate; when in a current, the blades are narrower and rounded or cuneate at the base. Flowing water also causes an elongation of the internodes and a marked reduction in the production of inflorescences.

An aquarium plant of *P. natans*, which grew from a seed in my laboratory, showed an interesting sequence of development. The first shoot produced only the linear submersed leaves; the second shoot produced some broad leaves, which were much narrower than normal and narrowly cuneate at base; the third shoot produced the typical broad floating leaves which were cordate at base. Then a number of shoots were sent up at about the same time, the floating leaf-blades of which, however, reverted to the narrow type with cuneate bases. Finally, the branching rhizome sent up numerous shoots, all of which produced submersed leaves only, or a few leaves with slightly dilated tips. Thus from one seed were produced forma *submersus* Glück, var. *prolixus* Koch, and var. *vulgaris* Koch & Ziz (var. *typicus*). The aquarium was not so constructed that var. *terrestris* S. F. Gray might appear.

An interesting form of *P. natans* which grew in the tidal water of Robinson Creek, Pembroke, Massachusetts, has been observed on several occasions by Prof. Fernald, and as it appeared to remain the same, was collected by Fernald and Svenson and distributed from the Gray Herbarium. With its reduced floating leaf-blades, narrowly cuneate at base, on long petioles, and its production of winter buds (collected in October), this is obviously an ecological state. Mr. Weatherby kindly drove me to the locality, but so many changes, attendant on the building of a paved road and a new bridge, have so altered the locality as described by Prof. Fernald that no *P. natans* was found. In such a habitat, where the tidal water rises and lowers twice a day and perhaps at times becomes slightly brackish, no fresh-water species of *Potamogeton* can be expected to lead a normal life. That the floating leaves of this plant were submersed at times is evidenced by the non-functional and reduced number of stomates.

Fryer's remarks on "some beautiful seedling forms of *P.*

natans, with lanceolate, oval, and round floating leaves, sufficient to afford examples of several named 'varieties', but unfortunately all growing on *one rootstock* in the instance in which the 'varieties' were most marked!" are of interest here.

American plants labeled "var. *prolixus*" include juvenile and elongated forms of *P. natans* and elongated forms of *P. Oakesianus*. They are always sterile.

8. P. Oakesianus Robbins

Rhizomes whitish with red spots. Stem often branched, terete, .5–1 mm. in diameter; stele with the trio-type pattern, the phloem on the inner face of the trio-bundle appearing as 2 patches; endodermis well developed, of U-cells; interlacunar and subepidermal bundles present; pseudohypodermis absent or 1 cell thick. Submersed Leaves delicate, narrowly linear, obtuse, 5–16 cm. long, (.25–) .3–1 mm. wide; nerves 3. Floating Leaves coriaceous, with long petioles .2–1 mm. thick; blades ovate-elliptical to oblong-elliptical, rounded or tapering at base, obtuse, (1.5–) 2–4 (–5.5) cm. long, 1–2 (–3) cm. wide; nerves (7–) 9–19 (–23), about one-third of them prominent; lacunae none or obscure. Stipules of the submersed leaves clasping the stem, whitish, delicately fibrous, persistent but becoming shreddy, linear, acutish when dry, about 1–3 cm. long; those of the floating leaves larger, 2–4 (–5.5) cm. long, linear or narrowly triangular, strongly fibrous, 2-keeled, at least at base. Peduncles thicker than the stem, .9–1.6 mm. in diameter, 2.5–6 cm. long. Spikes with 3–8 whorls; in fruit 1–3.5 cm. long, .7–.9 cm. thick. Flowers sessile or nearly so; sepaloid connectives 1.3–1.8 (–2.2) mm. wide; anthers about .8 mm. long. Fruits obovoid, 2.5–3.5 (3.7) mm. long, (1.6) 2–2.4 mm. wide; lateral keels rounded, dorsal keel usually prominent and acutish; beak short and broad; exocarp smooth or nearly so, greenish or rarely buff; endocarp with smooth sides, and with 2 rather deep sinuses on the back forming 3 obtuse keels, beak linear, about .8 mm. long, loop solid; apex of seed pointing a little above the basal end. Plants similar to *P. natans* but smaller.

P. Oakesianus Robbins in Gray, Man. Bot. ed. 5: 485 (1867); Morong, Mem. Torr. Club **3:** no. 2: 14 (1893); Taylor, N. Am. Fl. **17:** pt. 1: 16 (1909); Hagström, Crit. Res. Pot. 196 (1916). *P. Purshii* Tuckerm. sensu Graebn. in Engler, Pflanzenr. **4:** fam. 11: 45 (1907); ? Tuckerm., Amer. Journ. Sci. ser. 2: **6:** 228 (1848), see Fernald, Mem. Am. Acad. Arts & Sci. **17:** pt. 1: 121 & 122 (1932).

Shallow pools and edges of quiet ponds, Newfoundland, Anticosti, Magdalen Islands, Nova Scotia, eastern New Brunswick,

Maine, south to New Jersey, west to central New York, and local in Michigan, Wisconsin, and western Ontario. MAP 9. NEWFOUNDLAND: Quirpon Island, Straits of Belle Isle, *Wiegand, Gilbert & Hotchkiss 27339;* Grand Falls, *Fernald, Wiegand & Darlington 4464 & 4465;* Blomidon ("Blow-me-Down") Mts., *Fernald & Wiegand 2436;* Lookout Mt., Bonne Bay, *Fernald, Long & Fogg 1208;* McCleman's P., Crabbes, *R. B. Kennedy 543;* Port aux Basques, *Fernald, Long & Dunbar 26217.* QUEBEC: Les Trois Lacs, Laurentides, *Victorin, Rolland & Jacques 33639;* Rivière Noire, Portneuf Co., *Rousseau 25814;* Matamek R. Dist., North Shore, *Bowman 392.* ANTICOSTI: Ellis Bay, *Macoun 2993.* MAGDALEN ISLANDS: Coffin Island, *Fernald, Long & St. John 6764 & 6765;* Cap-de-l'Est, Ile de la Grande-Entrée, *Victorin & Rolland 9922.* NEW BRUNSWICK: Lac Fox Creek, Westmorland Co., *Victorin, Rolland & Jacques 44749;* Lily P., Southern Head, Grand Manan, Charlotte Co., *Knowlton & Weatherby 6632.* NOVA SCOTIA: Taylor's L., Sunny Brae, Pictou Co., *St. John 1373;* Clyde R., Shelbourne Co., *Prince & Atwood 1318* (S); Goose L., Argyle, Yarmouth Co., *Fernald & White 19680;* Petpeswick, Musquodoboit Harbour, Halifax Co., *Rousseau 35293;* Five-Island L., Hants Co., *Fernald, Bartram & Long 23131;* Lena L., St. Paul Island, *Perry & Roscoe 38.* MAINE: Haley P., Rangeley, Franklin Co., Sept. 1, 1894, *Furbish;* Gilead, Oxford Co., 1897, *Furbish;* Jordan P., Hancock Co., Sept. 10, 1898, *E. L. Rand;* Hackmatack Swamp, Isle au Haut, Knox Co., *A. F. Hill 1222;* Southport, Lincoln Co., *Fassett 18803;* Perley P., Sebago, Cumberland Co., *Fernald, Long & Norton 12384;* Lily P., East Limington, Limington, York Co., *Fernald, Long & Norton 12383.* NEW HAMPSHIRE: Connecticut R., Northumberland, Coös Co., *Pease 12171;* Wheeler P., Shelbourne, Coös Co., Aug. 31, 1918, *Deane;* Merrimack, Hillsboro Co., June 19, 1918, *Batchelder;* Stonehouse P., Barrington, Strafford Co., *Hodgdon 599.* VERMONT: Grout P., Stratton, Windham Co., *Eggleston 2111;* also Sept. 1, 1931, *R. J. Eaton.* MASSACHUSETTS: So. Natick, Middlesex Co., Sept. 15, 1881, *Morong;* Wellesley, Norfolk Co., July 20, 1908, *Wiegand;* Plymouth, Plymouth Co., June 24, 1895, *J. W. Blankinship;* Wellfleet, Barnstable Co., *Fernald & Fogg 505;* pond between Lizzie's P. and Goose P., Chatham, Barnstable Co., *Fernald 15955;* Edgartown, Dukes Co., *Seymour 1487;* Nantucket, Nantucket Co., 1886, *L. L. Dame;* Uxbridge, Worcester Co., Aug. 28, 1851, (TYPE in herb. N. Y. Bot. Gard., cotypes in F, G, NE) and Aug. 18, 1870, *Robbins*, also June 5, 9, & 24, 1876, *Morong;* Lake Chaubunagungamaug, Webster, Worcester Co., *Ogden & Bolan 1562;* Spectacle P., Sandisfield, Berkshire Co., June 29, 1912, *R. Hoffmann.* CONNECTICUT: Middlebury, New Haven Co., Sept. 14, 1901, *Harger;* Stafford, Aug. 1897, herb. *E. L. Morris.* NEW

York: Quiver P., Fourth L., Fulton Chain, Adirondack Mts., *Killip 12574* (US, mixed with *P. epihydrus* v. *Nuttallii*, G, not mixed); Brandy Brook Flow, Cranberry L., St. Lawrence Co., *Muenscher & Maguire 1711;* Big Moose L., Herkimer Co., *Muenscher & Maguire 1716;* Fall Creek, Tompkins Co., *Dudley;* Deep P., Wading R., Long Island, *E. S. Miller;* Rock P., Adirondacks, Aug. 5, 1884, *Morong;* McDonough, July 26, 1886, *F. V. Coville.* New Jersey: Pump Branch of Albertson Brook, Ancora, Camden Co., *J. W. Adams 511;* Magnolia L., Ocean View, Cape May Co., Sept. 29, 1921, *H. B. Meredith;* Estellville, Atlantic Co., July 4, 1883, *C. A. Gross.* Ontario: Sand Pt., Algoma Dist., Lat. 47° 00′ N., Long. 84° 45′ W., *Taylor et al. 297* (C). Michigan: bog near Rock R., Alger Co., *Fernald & Pease 3066;* Au Train, Alger Co., *Pease & Ogden 25135;* Crooked L., Clyde Twp., Allegan Co., Aug. 18, 1937, *D. L. Allen;* Crooked L. Marsh, Allegan Co., Aug. 4, 1938, *W. G. Erwin;* ½ mi. s. w. of West L., Portage Twp., Kalamazoo Co., *Hanes 407.* Wisconsin: Potter's Cranberry Farm, Cutler, Juneau Co., Sept. 23, 1932, *J. H. Steenis* (G); Valley of the Wisconsin R., near Grand Rapids, *Cheney 3610* (NY).

P. Oakesianus has the general appearance of *P. natans* except that it is uniformly smaller in all its parts. There are fundamental differences, however, chiefly in regard to the fruit. The fruit, besides being smaller, lacks the puckered, buff epicarp of *P. natans* and is, instead, stretched and smooth and usually green. The fruits also differ from those of *P. natans* by having 3 prominent keels. The other differences are mainly those correlated with size. While the submersed leaves of *P. natans* are generally borne on the single main stem, those of *P. Oakesianus* are on branches.

9. P. gramineus Linnaeus (American varieties)

Rhizome buff, often suffused or spotted with red, variable in thickness. Stem much branched, terete .5–1 mm. in diameter; stele with the oblong-type pattern with but 1 central bundle (rarely with 2) and usually but 1 lateral bundle on each side; endodermis of U-cells strongly thickened on the inner and lateral faces; interlacunar bundles strongly developed but only in the outer interlacunar circle; subepidermal bundles present or absent; pseudo-hypodermis absent or 1 cell thick. Submersed Leaves linear to linear-lanceolate or lance-elliptical (sometimes oblanceolate), 1–9 (–13) cm. long, (.1–) .2–1 (–1.5) cm. wide, tapering gradually to a sessile base; apex acute, usually sharp-pointed; nerves 3–9 (–11); lacunae of 1 or 2 rows along

midrib, mostly obscure; margins with fugacious 1-celled translucent denticles. Floating Leaves coriaceous, blades ovate to elliptical (rarely subrotund), 1.5–5 (–7) cm. long, 1–2 (–3) cm. wide; apex obtuse or bluntly mucronate; base cuneate or rounded; petioles 2–10 (–15) cm. long, mostly longer than the blades; nerves 13–17 (–23); lacunae obscure. Stipules persistent, obtuse and slightly cucullate at apex, those of the submersed leaves and branches .5–3 cm. long, 1–2 mm. wide at base, faintly 2-keeled, with 8 to 30 finer nerves, those of the floating leaves broader. Peduncles at base about same thickness as stem, sometimes clavate, 2–10 (–30) cm. long. Spikes in anthesis usually rather compact, of 5–10 whorls of flowers; in fruit cylindric and crowded, 1–2.5 cm. long, .6–.8 cm. thick. Flowers sessile or on pedicels up to .5 mm. long; sepaloid connectives orbicular to oval, blades (.7–) 1.2–1.6 (–2.3) mm. wide, claws (.2–) .4–.8 (–1) mm. long; anthers oblong .6–1 (–1.1) mm. long. Fruits mostly obovate, 1.7–2.5 (–2.8) mm. long (excluding beak), (1.4–) 1.6–2 (-2.3) mm. wide, keels usually strongly evident, but often obscured by the loose exocarp, beak facial, short and curved toward the back; exocarp usually loose, green or rarely tawny; endocarp with keels low and obtuse, beak linear, weak, .3–.5 mm. long, loop solid; apex of seed pointing .3–.7 mm. above the basal end. A variable species characterized by a stem with many lateral compound branches bearing numerous small leaves. Among the many variants of *P. gramineus*, the following seem worthy of recognition:

1. Principal submersed leaves narrowly elliptic to oblanceolate, (1–) 1.5–9 (–13) cm. long, .2–1 (–1.5) cm. wide, 5–10 times as long as broad, or if more than 10 times, then not less than 6 cm. long, sides not parallel; nerves (3–) 5–9.
   2. Principal submersed leaves (1–) 1.5–4.5 (–6.5) cm. long, .2–.6 (–.8) cm. wide; nerves 5–7 ..... 9a. var. *typicus*.
   2. Principal submersed leaves (3–) 6–9 (–13) cm. long, .6–1 (–1.5) cm. wide; nerves 7–9 (–11) ..... 9b. var. *maximus*.
1. Principal submersed leaves linear, (1–) 1.5–3.5 (–5.5) cm. long, .1–.25 (–.3) cm. wide, 10–20 (–30) times as long as broad, sides essentially parallel for most of their length, tapering at apex to an acute tip; nerves 3 ..... 9c. var. *myriophyllus*.

9a. P. gramineus L. var. typicus

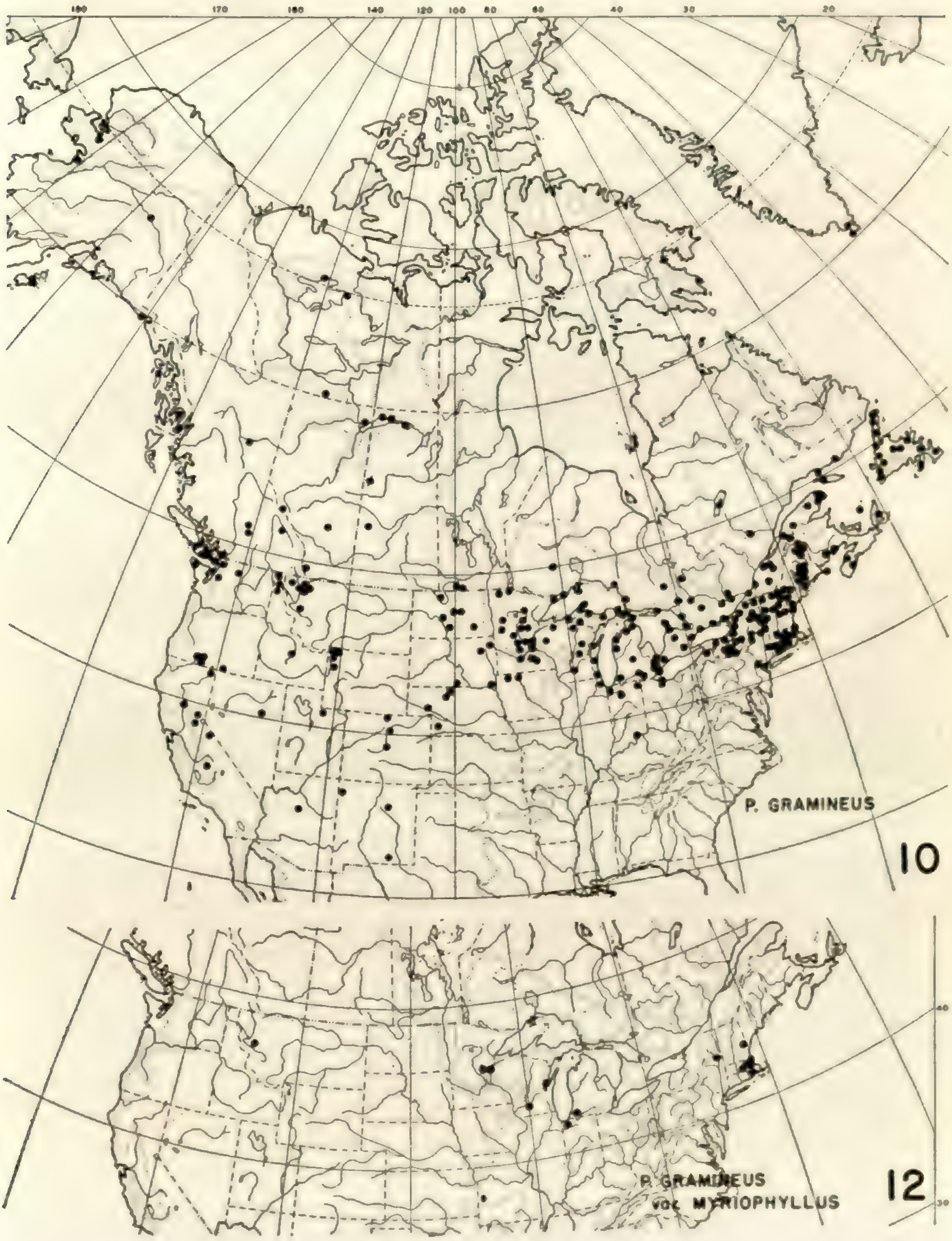
P. gramineus L., Sp. Pl. **1:** 127 (1753); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 84 (1907). *P. Proteus heterophyllus* C. & S., Linnaea **2:** 202 (1827). *P. gramineus* var. *graminifolius* Fries, Novit. Fl. Suecicae 36 (1828), and subsequent Am. authors. *P. heterophyllus* sensu Morong, Mem. Torr. Club **3:** no. 2: 23 (1893); Taylor, N. Am. Fl. **17:** pt. 1: 19 (1909); not Schreb. *P. heterophyllus* forma *graminifolius* Morong, Mem. Torr. Club **3:** no. 2: 24 (1893). *P. heterophyllus* forma *longipedunculatus* Morong,

Mem. Torr. Club **3:** no. 2: 24 (1893), at least in part. *P. gramineus* var. *longipedunculatus* Graebn. in Engler, Pflanzenr. **4:** fam. 11: 88 (1907). *P. heterophyllus* forma *terrestris* Robinson & Fern., Gray's Man., ed. **7:** 74 (1908). *Spirillus heterophyllus* Nieuwl., Am. Mid. Nat. **3:** 17 (1913). *P. gramineus* forma *longipedunculatus* House, Bull. N. Y. State Mus. **254:** 53 (1924), at least in part. *P. gramineus* forma *terrestris* Carpenter, Fl. Vt., 3rd rev. ed.: 25 (1937). *P. gramineus* var. *lacustris* sensu Hultén, Fl. Alaska and Yukon, pt. 1: 100 (1940).

Lakes and streams, southern Greenland to Alaska, south to New Jersey, Ohio, Indiana, Illinois, Iowa, Nebraska, New Mexico, Arizona, and California. Map 10. Eurasia. Of the very numerous collections of this variety the following are the most typical in the areas cited: Greenland: Igaliko, 1828, *J. Vahl*, also July 23, 1888, *Rosenvinge 2990;* Igaliko-Fjord, Qagssiarssuk, Aug. 5, 1925, *A. E. & M. P. Porsild;* Frederiksdal, July 25, 1925, *A. E. & M. P. Porsild.* Newfoundland: Bear Cove, Straits of Belle Isle, *Wiegand & Pease 27340;* Flower Cove, Straits of Belle Isle, *Fernald & Long 27345;* Birchy Cove (Curling), *Fernald, Wiegand & Kittredge 2445 & 2447;* Bonne Bay, Main R., *Fernald & Long 1210;* Highlands Brook, Crabbes, *Kennedy 82.* Quebec: Lake Mistassini, *Macoun 2980 & 2984;* Trout P., mouth of Grand R., *Collins, Fernald & Pease 4013½, 5287, 5314 & 5314A;* Lotbiniere, Lotbiniere Co., *Victorin, Rolland & Jacques 33714;* New Richmond, Bonaventure Co., *Victorin, Rolland & Jacques 33855;* Lake Temiscouata, *Victorin 526;* Farm Point, Gatineau R., *J. M. Macoun 80929;* Ottawa R. at Gatineau Point, *Malte 118257;* Blue Sea L., *Malte 118265;* Lac Wattopekah, St. Georges de Windsor, Richmond Co., *Louis-Marie, Laporte & Dudemaine 1403;* Black L., Megantic Co., *Fernald & Jackson 11988.* Anticosti: Ruisseau Harvey, Aug. 17, 1917, *Victorin 4195.* Magdalen Islands: Amherst Island, *St. John 1758* (toward var. *maximus*). Nova Scotia: Warren L., Cape Breton I., *Nichols 876;* George R., Cape Breton I., *Bissell & Linder 19692;* Little R., Tiddville, Digby Co., *Fernald & Long 19690.* New Brunswick: Nerepis R., Westfield, Kings Co., *Fernald 1619;* Hammond R., Hammond, Kings Co., *Svenson & Fassett 3046;* Lake Utopia, *Wetmore 2988;* Little Tobique L., *Hay 2989.* Maine: Fort Fairfield, Aroostook Co., *G. D. Chamberlain 1770;* Fish River L., Aroostook Co., *Ogden 1716;* Pushaw P., Glenburn, Penobscot Co., *Ogden & Steinmetz 1545;* Indian P., St. Albans, Somerset Co., *E. C. & Edith B. Ogden 2013;* Pitcher P., Northport, Waldo Co., *Ogden & Steinmetz 1612;* Wilson P., Wilton, Franklin Co., *Ogden & Marston 1698;* Presumpscot R., North Windham, July 9, 1899, *W. C. Kendall.* New Hampshire: Dead R., Berlin, Coös Co., *Pease 22754;* Lake Winnipisaukee near Melvin Village, Aug. 15, 1904,

M. A. Day. VERMONT: Little Otter Creek, Lake Champlain, Ferrisburg, Aug. 7, 12, and 20, 1880, *C. E. Faxon;* Queechee Gulf, July 29, 1890, *G. G. Kennedy;* Fairfield P., Fairfield, Franklin Co., *Blake 3071.* MASSACHUSETTS: Mystic L., July 4, 1852, *Robbins;* Fresh P., Cambridge, August 6, 1883, *Morong;* Sandy P., Lincoln, Sept. 15, 1868, herb. *Wm. Boott;* Natick, Aug. 14 and 17, 1883, *Morong.* CONNECTICUT: Selden's Cove, Lyme, Aug. 31, 1900, *C. B. Graves;* Pistapaug P., Durham, *Weatherby 3389;* several collections from Lake Saltonstall, E. Haven are typical *P. gramineus*, others from the same lake approach var. *myriophyllus*, still others approach var. *maximus* or are perhaps *P. gramineus* × *P. illinoensis.* NEW YORK: Butterfield L., Jefferson Co., *Muenscher & Maguire 1690;* Osgood P., Franklin Co., *Muenscher & Maguire 778;* Otsego L., Otsego Co., *Muenscher & Curtis 4880;* Bullhead P., Minerva, Essex Co., *House 15193;* Myers Pt., Ludlowville, Tompkins Co., Aug. 13, 1884, *W. R. Dudley.* NEW JERSEY: Morris P., Sept. 13, 1887, *N. L. Britton;* Morris L., Aug. 10, 1894, herb. *W. M. Van Sickle;* Lake Hopatcong, Morris Co., *C. F. Austin* (C, mixed with *P. gramineus* var. *maximus;* NY, not mixed); Swartzwood L., Sussex Co., *Griscom & Mackenzie 10686.* ONTARIO: Belleville, *Macoun 2985;* Great Opeongo L., Algonquin Park, *Macoun 22216 & 22217;* McGregor Bay, Manitoulin Dist., *Ogden & Bolan 1644 & 1645;* near Dyer Bay, Bruce Pen., *Pease & Ogden 24911;* Gillies L., Bruce Pen., *Cain 938;* Ko-Ko-Ko Bay, Lake Timagami, *Cain 1039 & 1042.* MICHIGAN: Isle Royale, *Cooper 69;* Seneca L., Keweenaw Co., *Hermann 8286;* Brevort L., Moran, Mackinac Co., *Ogden & Bolan 1680;* Lake Charlevoix, Ironton, Charlevoix Co., *Ogden & Bolan 1677;* Crystal L., Montcalm Co., July 1900, *C. F. Wheeler;* Manistee, Aug. 14, 1884, *Morong;* Pearl L., Benzie Co., *McAtee 3076.* OHIO: Sandusky Bay, July 20, 1895 and Sept. 2, 1898, *E. L. Moseley;* Put-in-Bay, Aug. 1898, *A. J. Pieters.* INDIANA: Wolf L., Hammond, *Agnes Chase 1707;* Clarke, Aug. 28, 1897 and June 29, 1898, *L. M. Umbach;* Lake Maxinkuckee, *Scovell 44*, also *Scovell & Clark 1221*, also *Evermann 1221.* WISCONSIN: Pell L., Bloomfield Twp., Walworth Co., *Hotchkiss & Koehler 4194;* near State House, Trout Lake, Vilas Co., *Fassett 9067 & 9069;* Green Bay, Big Suamico, Aug. 28, 1891 and July 31, 1893, *J. H. Schuette.* ILLINOIS: Edgewater, June 7, 1890, *L. N. Johnson;* Rogers Park, June 7, 1890, herb. *W. H. Dunham.* MANITOBA: 4 mi. w. of Hamiota, *Macoun & Herriot 76868;* Killarney, *Macoun 16441.* MINNESOTA: Green L., Kandiyohi Co., *Metcalf 2050;* Itasca Park, De Soto L., Becker Co., *Grant & Oosting 3272 & 3276;* Snail L., Ramsey Co., *Oosting 28166;* Horn L., Anoka Co., *Oosting 291 & 28100;* Muskeg Bay, Lake of the Woods, Warroad, Roseau Co., *Hotchkiss & Jones 417;* Long L. near Ely, St. Louis Co., *Hotchkiss & Jones 4083;* Pleasant L.,

Stearns Co., *Linsdale & Keck 1;* Dudley L., Rice Co., *Keck & Stilwill 373 & 379;* Birch L., Sherburne Co., *Kubichek 101;* Fish L., Chisago Co., *Kubichek 66;* Borden L., Garrison Twp., Crow Wing Co., *Hotchkiss & Jones 4112.* Iowa: Armstrong, Emmet Co., Aug. 8, 1891, June 20, 1897, and Aug. 21, 1897, *R. I. Cratty;* Lost Island L., Freeman Twp., Clay Co., *Hayden 821.* North Dakota: King Slough, s. of Bismark, *Metcalf 345;* Doctor L., Drake, *Mabbott 423;* Spiritwood, *Bergman 443;* Leeds, Benson Co., Aug. 2, 1899, Aug. 21, 1899, and Aug. 16, 1915, *J. Lunell.* South Dakota: South Bass P., Cottonwood L., Spink Co., *Over 17138;* eastern Day Co., *Over 14466.* Nebraska: Pelican L., *Thomson 153;* Red Willow L., *Thomson 361 & 365;* Enders L., *Thomson 16;* Dewey L., *Tolstead 615;* Shafer L., Garden Co., *Uhler & Martin 1656.* Mackenzie: Mosquito Creek and Driftwood R., Great Bear L., 66° 55′ N. 121° 20′ W., July 6–8, 1928, *A. E. & R. T. Porsild;* Edna Travers Bay, Great Bear L., 66° 25′ N. 117° 40′ W., *A. E. & R. T. Porsild.* Saskatchewan: vicinity of William Pt., Lake Athabasca, 59° 7′ 30″ N. 109° 19′ W., *Raup 6849;* Little Buffalo L., *J. M. Macoun 2975;* s. of Battleford, *Macoun 2981.* Alberta: east end of Crow's Nest Pass, Rocky Mts., *Macoun 23180;* Sand Pt., n. shore of Lake Athabasca, *Raup & Abbe 4614.* Montana: Mud L., Bigfork, Flathead L., *M. E. Jones 9293;* Flathead L., Big Fork, Flathead Co., *G. B. & R. P. Rossbach 17;* Whitefish L., Aug. 24, 1892, *R. S. Williams;* Lower Two Medicine Lakes, Glacier Nat'l Park, *Maguire 484;* Echo L., *MacDougal 639.* Idaho: Priest L., *MacDougal 241;* Lake Pend Oreille, *Sperry & Martin 719,* also *Henderson 4576;* Lake Pend Oreille, near Hope, *Sandberg, MacDougal & Heller 955 & 1026.* Wyoming: Shoshone Creek, Yellowstone, Aug. 23, 1878, *C. Richardson;* Yellowstone L., Yellowstone Park, *Tweedy 411;* Leighs L., Jacksons Hole, *Merrill & Wilcox 902.* Colorado: Estes Park, Lorimer Co., *Beetle 2341;* South Park, *Wolf 961;* near Boulder, Boulder Co., *Tweedy 4978.* Utah: Grassy L., Goodman Ranch, Bear R. valley, Uinta Mts., Summit Co., *Hermann 5781.* Nevada: Ruby L., *Watson 1134.* New Mexico: Petersen Reservoir, Montezuma (Hot Springs), San Miguel Co., *Drouet & Richards 3309;* Chusca Mts., San Juan Co., *Wetmore 550;* Dark Canyon, Guadalupe Mts., *Standley 40649.* Arizona: Mormon L., *MacDougal 80* (toward var. *maximus*). California: Little Hot Springs Valley, Modoc Co., Aug. 18, 1899, *M. S. Baker;* vicinity of Truckee, *A. E. Hitchcock 260;* Truckee R. watershed, Sierra Nevada range, *Benson 4013.* Oregon: Bear Flat, Lake Co., *Leiberg 751;* Guano Ranch, Lake Co., *Coville 602.* Washington: Lake Washington, Mercer Island, King Co., *Thomson 7589;* Ozette L., Clallam Co., *Otis 1584;* Blakeley Island, San Juan Islands, *S. M. & E. B. Zeller 1237;* Falcon Valley, Aug. 1, 1885, *W. N. Suksdorf* (toward



RANGES OF POTAMOGETON

var. *myriophyllus*). British Columbia: Kamloops, *Macoun 2974;* Wellington, Vancouver Island, *John Macoun 88254;* Sproat L., Albernie, Vancouver Island, *Carter 505.* Alaska: Yes Bay, *Howell 1668;* Fairbanks, *L. J. Palmer 1866.*

9b. P. gramineus L. var. maximus Morong ex Bennett

Var. *maximus* Morong ex Bennett, Journ. Bot. **19:** 241 (1881). *P. lonchites* Tuckerm., Am. Journ. Sci. ser. 2: **6:** 226 (1848), not Tuckerm., ibid ser. 2: **7:** 350 (1849) and subsequent Am. authors. *P. gramineus* var. *maximus* Morong, Bull. Torr. Club **13:** 155 (1886), without description. *P. heterophyllus* forma *maximus* Morong, Mem. Torr. Bot. Club **3:** no. 2: 25 (1893). *P. gramineus* var. *maximus* Graebn. in Engler, Pflanzenr. **4:** fam. 11: 88 (1907). *P. heterophyllus* in part, Taylor, N. Am. Fl. **17:** pt. 1: 19 (1909). *P. gramineus* f. *Wolfgangii* sensu Hagstr., Crit. Res. Pot. 209 (1916), as to American citations. *P. gramineus* f. *jemtlandicus* sensu Hagstr., Crit. Res. Pot. 209 (1916), as to American citations.

Lakes and streams, often in flowing water, with the typical variety and having essentially the same range in North America. Map 11. Among many collections, the following are the most representative from the areas cited: Labrador: 18 mi. up Naskaupi R., Lake Melville Dist., *R. H. Wetmore 103096.* Newfoundland: Rushy P., Exploits R., *Fernald, Wiegand, Bartram & Darlington 4477;* Lewisport, Notre Dame Bay, *Fernald, Wiegand & Darlington 4480.* Quebec: Lac des Quinze (Baie Gilies), Temiscaming-Abitibi, *Victorin 8194 & 8195;* Roberval, July 16, 1892, *Geo. G. Kennedy;* Deschenes, near Hull, *Malte 118263;* Lac Saint-Jean, *Victorin 16064.* Anticosti: Rivière McKane, *Victorin & Rolland 27095;* Pointe de l'Est, *Victorin & Rolland 27094.* New Brunswick: Titusville, *Brittain 2987;* near St. John R., Connors, *Pease 2589.* Nova Scotia: Salmon R., Truro, Colchester Co., *Bean & White 22962.* Maine: Aroostook R., Ft. Fairfield, July 18, 1893, *Fernald;* St. John R., Ft. Kent, *Mackenzie 3613;* Dead R., Somerset Co., *Fernald & Strong 477;* stream below Dwinall P., Winn, Penobscot Co., *Steinmetz 365;* Stillwater R., Old Town, Penobscot Co., *Ogden & Steinmetz 1602;* Orland R., Orland, Penobscot Co., *Ogden & Marston 1694.* New Hampshire: Connecticut R., Walpole, *Fernald 436;* Connecticut R., near Hanover, July 26 and Aug., 1876, *H. G. Jesup* (not typical). Vermont: Little Otter Creek, Lake Champlain, Aug. 7, 1880, herb. *E. & C. E. Faxon* (not typical). Massachusetts: Charles R., Dedham, July 14, 1879 and July 16, 1880, *Morong*, also Aug. 2, 1880, *C. E. Faxon;* Charles R., S. Natick, July 14, 1879 and Sept. 5, 1882, *Morong;* Charles R., Needham, *Tuckerman;* Ashland, July 9, 1879, herb. *Morong.* Connecticut: Quinnipiac R. at Old Turnpike,

Southington, Aug. 17, 1900 and Aug. 17, 1901, *C. H. Bissell;* Housatonic R., near Lake Zoar, Southbury, *E. H. Eames 11745.* NEW YORK: Saranac R., Adirondacks, July 31, 1884, *Morong;* French Creek, Clayton, Jefferson Co., *Muenscher & Maguire 1693;* Hudson R., below Glen Falls, Warren Co., *Muenscher & Lindsey 2769;* Song L., Cortland Co., *Muenscher & Curtis 4841;* Buffalo, *Clinton 5.* NEW JERSEY: Delaware R., Hunterdon Co., Sept. 19, 1885, *T. C. Porter;* Lake Hopatcong, *C. F. Austin* (C, mixed with *P. gramineus* var. *typicus*). PENNSYLVANIA: Penn's Creek at "Swinging Bridge," Selinsgrove, Snyder Co., *Moldenke 4207.* ONTARIO: Dog R., above Michipicoten, *John Macoun 97;* Ottawa R., Rockliffe, *John Macoun 85536;* Ottawa R., *Harrington 99086 & 99102;* Templeton, *Scott 16444.* MICHIGAN: St. Clair R., near Port Huron, *Dodge 155;* Sault R., near Sault Sainte Marie, Aug. 11, 1910, *J. R. Churchill* (not typical). OHIO: Sandusky Bay, Aug. 19 and Aug. 31, 1898, *A. J. Pieters* (not typical, perhaps *P. gramineus* × *P. illinoensis*). WISCONSIN: Wisconsin R., near Lac Vieux Desert, *Cheney 683;* Green Bay near Big Suamico shore, Brown Co., July 11, 1886, *J. H. Schuette* (not typical, perhaps *P. gramineus* × *P. illinoensis*). MINNESOTA: Vermilion L., July 28, 1886, *L. H. Bailey,* also *Arthur, Bailey & Holway B46, B69 & B403;* Garden Island, Lake of the Woods, *MacMillan & Sheldon 1332;* near mouth of Brule R., Cook Co., *Rosendahl & Butters 4638.* IOWA: Armstrong, Emmet Co., July 11 and Aug. 21, 1897, *R. I. Cratty.* NORTH DAKOTA: Leeds, Benson Co., July 2, 1906, *J. Lunell.* MACKENZIE: Edna Travers Bay, Great Bear L., Aug. 8, 1928, *A. E. & R. T. Porsild.* SASKATCHEWAN: along Grand Trunk Pacific R. R., Yorkton, *Macoun & Herriot 76869.* ALBERTA: Murdock Creek Dist.. Wood Buffalo Park, *Raup 1546;* L. Mamawi, Wood Buffalo Park, *Raup 1548.* MONTANA: Midvale, *Umbach 457.* IDAHO: Moose Creek, near Big Springs, Fremont Co., *G. B. & R. P. Rossbach 20.* WYOMING: Obsidian Creek, Yellowstone Nat'l Park, *Aven & Elias Nelson 6061.* COLORADO: Trout L., near Lizard Head Pass, San Miguel Co., *Maguire, Piranian & Richards 12771.* UTAH: Salt Lake City, *M. E. Jones 1304;* Dry L., Cache Co., *Maguire 13149.* NEW MEXICO: Chusca Mts., San Juan Co., *Wetmore 549.* ARIZONA: Crater L., San Francisco Mts., Aug. 1886, *Lemmon Herbarium.* CALIFORNIA: Lily L., near Fallen Leaf, Lake Tahoe region, Eldorado Co., *Wiggins 6775.* WASHINGTON: Tumwater Canyon, Wenatchee R., *Sandberg & Leiberg 524;* Camas Land, Wenatchee Mts., Chelan Co., *Thompson 11768.* BRITISH COLUMBIA: Shawnigan L., Vancouver Island, *John Macoun 88253.* ALASKA: Sitka, *Evans 780;* Selawik L., *L. J. Palmer 638* (US, mixed with *P. Richardsonii*).

9c. P. GRAMINEUS L. var. MYRIOPHYLLUS Robbins

Var. *myriophyllus* Robbins in A. Gray, Man. ed. 5: 487 (1867). *P. heterophyllus* forma *myriophyllus* Morong, Mem. Torr. Club **3:** no. 2: 24 (1893). *P. heterophyllus* forma *minimus* Morong, Mem. Torr. Club **3:** no. 2: 25 (1893). *P. gramineus* var. *myriophyllus* Graebn. in Engler, Pflanzenr. **4:** fam. 11: 87 (1907); Hagstr., Crit. Res. Pot. 209 (1916). *P. gramineus* var. *minimus* Graebn. in Engler, Pflanzenr. **4:** fam. 11: 89 (1907). *P. heterophyllus* Taylor, N. Am. Fl. **17:** pt. 1: 19 (1909), in part. *P. gramineus* forma *myriophyllus* House, N. Y. State Mus. Bull. **254:** 53 (1924).

Quiet water, local in New Hampshire, Massachusetts, Rhode Island, New York, Michigan, Indiana, Wisconsin, Minnesota, and Montana. MAP 12. Although many collections approach this variety, only the following are considered typical: NEW HAMPSHIRE: Lake Winnepesaukee, 1876, *W. F. Flint.* MASSACHUSETTS: Spot P., Stoneham, Aug. 20, 1865, herb. *Wm. Boott,* also July 27, 1876, *Morong,* also Aug. 13, 1880, herb. *E. & C. E. Faxon;* Spot P., Wyoming, Aug. 13, 1880, herb. *C. E. Faxon;* Spot P., Melrose, Aug. 13, 1880, *Edwin Faxon;* Winter P., Winchester, Middlesex Co., *Fernald & Svenson 744;* Wakefield, Sept. 13, 1876, *J. W. Chickering;* Lake Pattaquatic, Ware, Aug. 25, 1905, *E. L. Morris.* RHODE ISLAND: Apponaug P., Apponaug, Oct. 14, 1865, Robbins (TYPE in NY), also Aug. 1879, Sept. 29, 1879 and Aug. 26, 1880, *Morong,* also Aug. 26, 1880, *E. Faxon,* also Aug. 26, 1880 herb. *E. & C. E. Faxon* ("Kingston" appears on the labels, which is an error, for the collection was made at Apponaug in the town of Warwick), also Aug. 24, 1881, *E. Faxon,* also Aug. 25, 1881, *Morong;* Gorton's P. (Apponaug P. of early botanical collectors), Apponaug, town of Warwick, *E. C. & E. B. Ogden 1765.* NEW YORK: Mud P., Pattens Mills, Warren Co., Aug. 25, 1918, *S. H. Burnham;* Friends L., Warren Co., *Muenscher & Lindsey 2775.* MICHIGAN: Sister Lakes, Van Buren Co., *De Selm 22.* INDIANA: Dune Park, *Peattie 2305.* WISCONSIN: Oneida Reservation, Sept. 8, 1881, *J. H. Schuette;* Devils L., Sauk Co., *Fassett 14262.* MINNESOTA: Lake Mora, Kanabec Co., July 1892, *E. P. Sheldon;* Milaca, Mille Lacs Co., July 1892, *E. P. Sheldon.* MONTANA: Bitterroot R., s. w. of Missoula, Missoula Co., *Barkley 1996.*

The extremely variable *P. gramineus* which often approaches in appearance its near relative, *P. illinoensis,* is further complicated by the fact that it hybridizes with most (perhaps all) of the other broad-leaved species of the genus and even one (perhaps more) linear-leaved species. In North America three varieties can be recognized which, though distinct in their extreme de-

velopments, intergrade freely. The variety that appears to be identical with the one upon which the species is based (var. *typicus*) is by far the most common, and is rather widespread in both Europe and North America. Its much branched stem has usually an abundance of small elliptic-lanceolate submersed leaves which distinguish it from all other species of *Potamogeton* as well as from the other varieties of the same species.

The variety *myriophyllus* has a stem even more branched and the leaves still smaller but with parallel margins. This would seem to be but an ecological form were it not found in somewhat different habitats, according to data on labels. When I collected it in Apponaug Pond in 1938 it was exactly like the plants Robbins collected there in 1865.

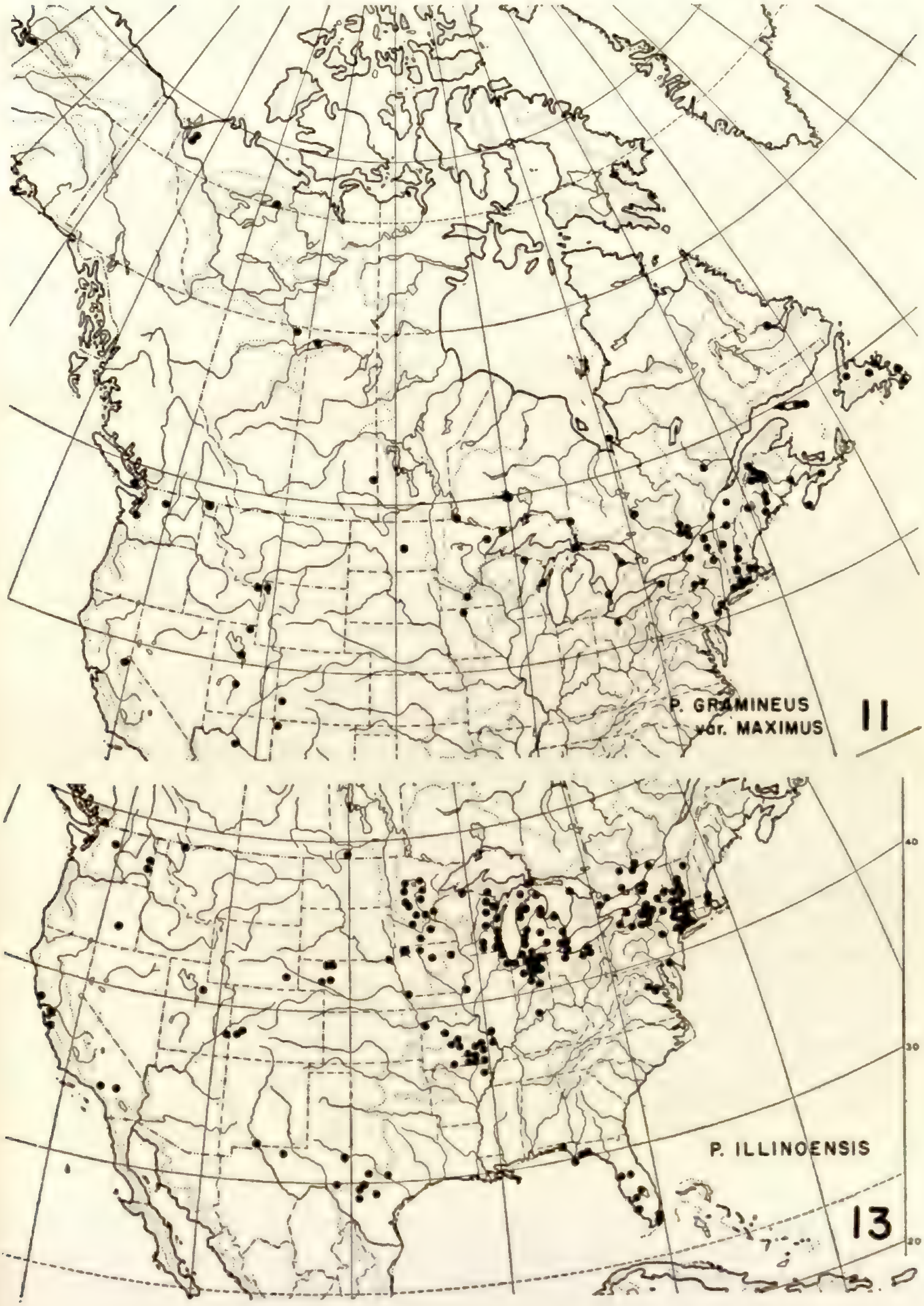
The variety *maximus* is perhaps the most variable one. It differs from the other variants of the species in the larger size of the submersed leaves, less branching of the stem, and usually longer internodes. While for most collections this variety seems to be genetic, for many the condition appears to be ecological. It is oftentimes very difficult to distinguish it from hybrids having *P. gramineus* for one of the parents. It can usually be distinguished from *P. gramineus* × *P. illinoensis*, which appears most like it, by the more flaccid stem and leaves of the variety.

Plants appearing like typical *P. gramineus* or var. *maximus*, except that the submersed leaves are oblanceolate or spatulate, with the apex rounded, mucronate, or cuspidate (often with many variations on the same plant) occur. These have been called *P. gramineus* var. *spathulaeformis*. The type material upon which this name is based is from the Mystic Lakes, Medford, Mass. and proves to be *P. gramineus* × *P. illinoensis*. Plants with submersed leaves somewhat similar but usually smaller and with floating leaves usually orbicular or very short-elliptic occur in Newfoundland, Quebec, New Brunswick, Vermont, New York, Ontario, Michigan, Minnesota and Iowa. While the usual stem-anatomy pattern is that of *P. gramineus*, occasionally O-cells are found in the endodermis, thus pointing toward a parent (or grandparent) with an endodermis of O-cells. The broad rounded apex of the submersed leaves and the nearly orbicular floating leaves point to an ancestor with broad rounded leaves. Some of these plants are *P. gramineus* × *P. perfoliatus*,

others are *P. gramineus* × *P. Richardsonii*, in both cases probably backcrossed with *P. gramineus*. At Moran, Mackinac Co., Michigan, in the shallow water at the northwest end of Brevort Lake, I found typical *P. gramineus* (*Ogden & Bolan 1680*) and obvious *P. gramineus* × *P. Richardsonii* (*Ogden & Bolan 1681*, with *Richardsonii*-like submersed leaves and *gramineus*-like floating leaves) and clearly intermediate between the two a plant with oblanceolate submersed leaves (*Ogden & Bolan 1681* in Gray Herbarium). See discussion of these hybrids on later pages. Not all oblanceolate-leaved plants are hybrids, however, for leaves of the typical variety or of the variety *maximus* which have been produced at the surface of the water may tend to form a transition to the floating type, which may narrow the lower half and produce a mucro at the apex; in such cases the lower leaves, if submersed, will have the normal shape. Then, too, submersed leaves often have a tendency for the edges of the lower part to curl under, giving the leaf a false oblanceolate shape which close examination will detect.

10. P. illinoensis Morong

Rhizome buff, spotted, streaked, or suffused with red, as thick as or thicker than the stem. Stem simple or branched, terete, but sometimes much flattened when pressed, (1–) 1.5–5 mm. in diameter; stele with the proto-type, trio-type, or oblong-type pattern with (1) 2 central bundles and 2 or more lateral bundles on each side; endodermis of strongly developed U-cells; interlacunar bundles strongly developed in the outer interlacunar circle, sometimes a few in the next to the outer circle; subepidermal bundles present or absent; pseudo-hypodermis absent or 1 cell thick. Submersed Leaves thin, elliptic or oblong-elliptic (sometimes ovate-elliptic) to lanceolate or linear (by the further reduction of the blade to the midrib), often somewhat arcuate; blades 5–20 cm. long, (.2–) 1.5–4 (–4.5) cm. wide, sessile or tapering (except when reduced to midrib) into petioles up to 4 cm. long; apices acute, usually somewhat mucronate; nerves (7–) 9–17 (–19); lacunae of 2–5 rows along midrib and larger nerves; margin with fugacious 1-celled translucent denticles. Floating Leaves (often absent) more or less coriaceous, transition to submersed leaves usually gradual; blades elliptic, ovate-elliptic, or oblong-elliptic, 4–13 (–19) cm. long, 2–6.5 cm. wide; apices obtuse, ending in a blunt mucro; bases cuneate or rounded; petioles 2–9 cm. long, shorter than the blade; nerves 13–29; lacunae of 2 or 3 rows of cells along midrib, some-



RANGES OF POTAMOGETON

times obscure. Stipules persistent, divergent and conspicuous, obtuse, those of the submersed leaves (1–) 2.5–8 cm. long, (.3–) .5–1.2 cm. wide at base, prominently 2-keeled, with 15–35 finer nerves; those of the floating leaves broader. Peduncles as thick as or thicker than the stem, 4–15 (–30) cm. long. Spikes in anthesis more or less compact, of 8–15 whorls of flowers; in fruit cylindric and crowded (2.5–) 3–6 (–7) cm. long, .8–1 cm. thick. Flowers sessile or on pedicels up to .5 mm. long; sepaloid connectives orbicular to oval (or reniform), blades (1.3–) 1.6–3 (–3.2) mm. wide, claws 1–1.5 mm. long; anthers oblong, .6–2 mm. long. Fruits obovate to orbicular or ovate (2.5–) 2.7–3.5 (–3.6) mm. long (excluding beak), (2.1–) 2.2–3 mm. wide; sides flat; keels prominent and acute, the dorsal strongly developed above and below, the laterals less strongly developed but often each with a projecting knob at the base; beak facial, short, erect or curved toward the back; exocarp gray-green to olive-green (rarely brownish); endocarp with keels low but prominent, or with dorsal keel thin and very weak, beak deltoid, very weak, about .5 mm. long, loop solid; apex of seed pointing at about the middle of the opposite side (or between middle and base). A highly variable species in which the extremes appear distinct, but transitional specimens, which are not the exception but the rule, indicate that they are a confluent series.

P. illinoensis Morong, Bot. Gaz. **5:** 50 (1880); Mem. Torr. Club **3:** no. 2: 27 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 80 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 20 (1909); Hagstr., Crit. Res. Pot. 198 (1916). *P. lucens* of Am. authors; not L., Sp. Pl. 126 (1753). *P. Zizii* of Am. authors, in part; not M. & K. in Röhling, Deutschl. Fl. **1:** 845 (1823); not Koch ex Roth, Enum. Plant. Germ. **1:** 531 (1827). *P. Proteus lucens* C. & S., Linnaea **2:** 197 (1827) . *P. Proteus Zizii* C. & S., Linnaea **2:** 201 (1827), in part. *P. lucens* var. *connecticutensis* Robbins in A. Gray, Man. ed. 5: 488 (1867); Morong, Mem. Torr. Club **3:** no. 2: 31 (1893). *P. angustifolius* var. *connecticutensis* Bennett, Journ. Bot. **39:** 199 (1901). *P. Zizii* var. *connecticutensis* Morong ex Bennett, Journ. Bot. **39:** 199 (1901); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 83 (1907). *P. lucens* var. *floridanus* Bennett in Graebn. in Engler, Pflanzenr. **4:** fam. 11: 79 & 161 (1907); Bennett, Journ. Bot. **45:** 374 (1907). *?P. Zizii* var. *porrectifolius* Bennett in Graebn. in Engler, Pflanzenr. **4:** fam. 11: 83 (1907). *?P. Zizii* var. *gracilis* Bennett in Graebn. Pflanzenr. l. c. (1907). *Spirillus lucens* Nieuwland, Am. Mid. Nat. **3:** 17 (1913), as to plant, not as to source of name. *Spirillus Zizii* Nieuwland, Am. Mid. Nat. **3:** 17 (1913), in part. *P. illinoensis* forma *rosulatus* Hagstr., Crit. Res. Pot. 199 (1916). *P. illinoensis* forma *homophyllus* Hagstr., Crit. Res. Pot. 199 (1916). × *P. pseudolucens* Hagstr., Crit. Res. Pot. 199 (1916).

? × *P. perplexus* Benn., Trans. & Proc. Bot. Soc. Edinburgh **29:** 53 (1924).

Lakes and streams, southwestern Quebec to southern British Columbia, south to Florida, Texas and California, MAP 13. Mex., Centr. Am., and W. I. Of the very numerous collections, the following are the most typical from the areas cited: QUEBEC: Gatineau R., Wakefield, *Macoun 62021.* VERMONT: Lake Dunmore, Salisbury, Aug. 11 and 31, 1896 and Sept. 2, 1899, *Ezra Brainerd;* Lake Champlain, Sept. 1, 1880, *C. E. Faxon;* Lake Hortonia, Aug. 15, 1896, *Ezra Brainerd;* Barton P., 1829, herb. *Robbins.* MASSACHUSETTS: Fresh P., Cambridge, many collectors; Wenham P., Essex Co., Sept. 21, 1867, *J. W. Robbins;* Leverett P., July 1874, *H. G. Jesup.* CONNECTICUT: Lake Saltonstall, E. Haven, 1845, *Robbins*, also 1850, *Robbins* (G, NY, type collection of *P. lucens* v. *connecticutensis*); Lake Kenosha, Danbury, *E. H. Eames 11351;* Housatonic R., Aug. 1867, *Robbins;* Twin Lakes, Salisbury, Litchfield Co., *Ogden & Bolan 1569.* NEW YORK: Rockland L., July 17, 1892, *Morong;* Lake Cayuga, Cayuga, Aug. 20, 1884, *Morong;* Duck L., Conquest, Cayuga Co., *Eames, Randolph & Wiegand 11175;* bayou back of Renwick Park, Cayuga L., Ithaca, Tompkins Co., *Hitchcock 11175a;* n. of R. R. bridge, Cayuga, Cayuga Co., Oct. 1886, *W. R. Dudley;* Lake Oneida, July 28, 1880, *Miss M. T. Hotchkiss;* Lake Cossayuna, *Dobbin 1112;* Muskalonge Bay, Jefferson Co., *Muenscher & Maguire 1701;* Ballston L., Saratoga Co., *Muenscher & Clausen 4232 & 4233;* Warner L., Albany Co., *Muenscher & Clausen 4238;* Little York L., Preble, Cortland Co., *R. N. Jones 7465;* Greens L., Greene Co., *Muenscher & Curtis 5427.* PENNSYLVANIA: Lehigh, 1876, *E. A. Rau* (ME, "Hanover, Ind." printed on the label). DELAWARE: Stanton, Sept. 4, 1896, *A. Commons.* VIRGINIA: Four Mile Run, Alexandria, June 29, 1903, *I. Tidestrom;* Dyke, Fairfax Co., *Metcalf & Sperry 1690.* NORTH CAROLINA: Orton L., Orton Plantation, 10 mi. n. of Southport, Brunswick Co., Sept. 8, 1941, *R. K. Godfrey* (G). FLORIDA: near the south New R. canal, beyond head of New R., *J. K. & G. K. Small 4437;* near the Miami canal, *J. K. & G. K. Small 4486;* between Cutler and Longview Camp, *Small & Carter 1007;* Royal Palm Park, Dade Co., *Moldenke 752;* near Eustis, Lake Co., Oklawaha R., *Nash 859 & 1750,* also *Curtiss 6692;* Caloosa R., *Simpson 386;* Everglades, Miami R., *Small & Carter 1118* (F, NY, US, type collection of *P. lucens* v. *floridanus*). ONTARIO: Golden L., Renfrew Co., July 28, 1899, *L. M. Umbach;* Pelee Island, Lake Erie, *Macoun 3023;* River Trent, *Macoun 2995;* Elziver, Hastings Co., *Macoun 2996;* Stokes Bay, Tobermory, Bruce Co., *Krotkov 7027.* MICHIGAN: Whitefish L., Mackinac Co., *Metcalf 2317;* n. w. of St. Ignace, Mackinac Co., *Pease & Ogden 24964;* Lake Orion, *Farwell 900;* Houghton L.,

Roscommon Co., June 1876, herb. *C. F. Wheeler;* Swan L., Allegan Co., *Wight 8;* Papaw L., Berrien Co., *C. K. Dodge 171;* Pine L., Clinton Co., *C. F. Wheeler 11 & 24.* Ohio: East Harbor, Ottawa Co., Aug. 10, 1898, *E. L. Moseley;* Bass L., Geauga Co., *Werner 954;* Sandusky Bay, Aug. 31, 1898, *A. J. Pieters.* Indiana: Old L., Whitley Co., *Deam 49428;* Tippecanoe L., *Scovell 53;* Lake Maxinkuckee, *Scovell 54,* also *Evermann 1079 & 1222,* also *Clark 6;* Lake Maxinkuckee, Culver, Marshall Co., Aug. 27, 1926, *J. R. Churchill;* Pine Station, Lake Co., Aug. 8, 1876, *E. J. Hill;* Clarke, *Umbach,* also *Lansing 1079;* Atwood L., n. w. of Wolcottville, Lagrange Co., *Deam 55350;* Lake Wawasee, Kosciusko Co., *Deam 56396 & 56401;* Lake James, w. of Pokagon State Park, Steuben Co., *Deam 56538 & 56539.* Wisconsin: Lake Wingra, Dane Co., June 20, 1892, *L. S. Cheney;* White L., near Weyauwega, Waupaca Co., *Hotchkiss & Martin 4432;* Pickerel L., Nashville Twp., Forest Co., *Hotchkiss & Koehler 4331;* Big Muskego L., Muskego Twp., Waukesha Co., *Hotchkiss & Koehler 4245;* Wind L., Norway Twp., Racine Co., *Hotchkiss & Koehler 4226 & 4227;* Pike L., Hartford Twp., Washington Co., *Hotchkiss & Koehler 4262;* Shawano L., Washington Twp., Shawano Co., *Hotchkiss & Koehler 4304;* Lake Noque Bay, Lake Twp., Marinette Co., *Hotchkiss & Koehler 4326.* Illinois: Mississippi River Bottoms near Oquawka, July 23, 1873, Aug. and Sept. 1881, *H. N. Patterson* (type material); Pittsburger L., Centerville, June 29, 1878, *H. Eggert;* Lake Villa, Sept. 28, 1887, *M. B. Waite.* Manitoba: Souris, July 7, 1883, *J. M. Macoun.* Minnesota: Elk L., Itaska Park, Clearwater Co., *Grant & Oosting 3184;* Evans L., Kandiyohi Co., *Metcalf 2377;* Green L., Kandiyohi Co., *Metcalf 2039, 2048 & 2045;* Lake Lizzie, Ottertail Co., *Metcalf 1563;* Rice L., Paynesville, *Metcalf 1427 & 1432;* Koronis L., Stearns Co., *Metcalf 1379, 1383 & 1391,* also *Kubichek 110, 114, 115 & 121;* Swan L., Nicollet Co., *Metcalf 8;* Martin L., Anoka Co., *Metcalf 1329;* Birch L., Sherburne Co., *Metcalf 1370;* Horseshoe L., Chisago Co., *Kubichek 71 & 72;* Prior L., Scott Co., *Oosting 2938;* Lake Ida, Douglas Co., *Uhler & Warren 858;* Lake Julia, Sherburne Co., *Keck & Stevens 280;* Borden L., Garrison Twp., Crow Wing Co., *Hotchkiss & Jones 4113;* Center City, Aug. 1892, *B. C. Taylor;* Two Inlet L., Becker Co., *Shunk & Manning 237.* Iowa: Armstrong's Grove, Emmet Co., July 21, 1882, *R. I. Cratty* (cotype collection of *P. illinoensis*); Fayette, July 1894, *B. Fink 191;* Fremont Co., Aug. 2, 1898, herb. *T. J. & M. F. L. Fitzpatrick;* Clear L., Cerro Gordo Co., July 11, 1896, *B. Shimek.* Missouri: Fish L., Sibley, Jackson Co., *Mackenzie 293;* Gasconade R., between Falcon and Nebo, Laclede Co., *Steyermark 13910;* Current R., n. of Buffalo Creek, e. of Bennett, Ripley Co., *Steyermark 14285;* Phillips Spring, s. e. of Van Buren, Carter Co., *Steyermark 21235;*

Marble Creek, s. of French Mills, St. Francois Purchase Unit, Clark Nat. Forest, Madison Co., *Steyermark 21087*. ARKANSAS: St. Francis R., Paragould, Greene Co., June 27, 1893, *H. Eggert*. SOUTH DAKOTA: water hole near Missouri R., Clay Co., *Over 4008*. NEBRASKA: Rat L., *Thomson 53;* Swan L., s. of Whitman, Grant Co., *Rydberg 1440;* Shafer L., Garden Co., *Uhler & Martin 1662;* Hackberry L., Cherry Co., *Thomson 145*, also *Sharp 11;* Dewey L., Cherry Co., *Tolstead 614*. TEXAS: Guadalupe R., Kerrville, Kerr Co., *E. J. Palmer 12217;* 16 mi. n. of Leakey, Real Co., *Cory 8502;* San Antonio, *Thurber 48;* Montell Creek, Uvalde, *Cory 9800*; McKittrick Canyon, Guadalupe Mts., Culberson Co., *Moore & Steyermark 3667* (not typical). WYOMING: Laramie R., *Elias Nelson 3386*. COLORADO: Tabequache Basin, *Payson 174;* Cerro Summit, region of Gunnison Watershed, *Baker 427*. UTAH: Twelve Mile Cañon, Wasatch Mts., *Tidestrom 517*. NEW MEXICO: San Augustine Ranch, Organ Mts., Dona Ana Co., July 10, 1909, *E. O. Wooton*. CALIFORNIA: Marine Hospital, San Francisco, June 27, 1892, *J. W. Blankinship;* Mission Dolores, *Bolander 274;* near Sebastopol, Sonoma Co., Aug. 1900, *M. S. Baker;* Mountain L., San Francisco, Aug. 22, 1920, *Alice Eastwood* (not typical). OREGON: creeks, western Oregon, 1880, *T. J. Howell;* in a warm spring, Harney Valley, June 10, 1885, *Thomas Howell* (F, mixed with *P. alpinus* v. *tenuifolius*, C, G, US, not mixed). WASHINGTON: Lake Chelan, Washington Forest Reserve, *Gorman 703;* Turnbull Slough, Spokane Co., *Sperry & Martin 731*. BRITISH COLUMBIA: Sumas L., Chilliwack Valley, *J. M. Macoun 26815* (perhaps a hybrid; type of × *P. perplexus* in C, isotypes in G, NY).

The highly complex species, *P. illinoensis*, has been variously treated by students of the genus. Morong[1] restricted the name to two collections of those known to him: Oquawka, Ill., collected by H. N. Patterson, and Armstrong's Grove, Iowa, collected by R. I. Cratty. Both plants are very robust and evidently grew in shallow, quiet, rich, muddy water. He complained that some botanists doubted the validity of *P. illinoensis* as a distinct species, but argued that it ". . . is evidently allied to *lucens* in habit, and with that species, *P. angustifolius*, *P. spathulaeformis* and *P. heterophyllus*, forms a very natural group, but it is clearly distinct from all of them in its vigorous growth, its abundant foliage, its ample floating and submerged leaves, and its large, strongly 3-keeled fruit."[2] Of these characters, the only one that can be considered of specific importance is that per-

[1] Thomas Morong, Mem. Torr. Club, 3: no. 2: 27 (1893).
[2] Thomas Morong, Mem. Torr. Club 3: no. 2: 28 (1893).

taining to the fruit, and examination shows that the fruits of the plants in this country called *P. lucens* or *P. angustifolius* are as strongly 3-keeled as those of *P. illinoensis*. Graebner's treatment of this group is quite artificial. He followed Morong's grouping rather closely but recognized numerous subspecies, varieties, subvarieties, and forms to account for the minor divergencies. The name *P. illinoensis* was, however, confined to the two original collections. Hagström evidently made a genuine attempt to understand the complex. Lack of sufficient material greatly handicapped him. He was misled by previous treatments into believing that *P. lucens* occurs in this country, but cited no specimens. Morong, who had realized that the plants he referred to *P. lucens* did not match any of the European forms of that species, treated them as var. *connecticutensis*. Hagström ignored this, except to question its being a variety of *P. lucens*, and does not even include it as a synonym. Some sterile specimens in North America resemble *P. lucens* of Europe but they lack the tendency for the lower leaves to have the blades reduced at the apex so that the midrib extends well beyond as a cusp. When mature fruits are obtained, the keels are seen to be prominent and acute (those of *P. lucens* are low and rounded) and the beak is more facial. Interestingly enough, specimens with mature fruit do not have the compact, bushy habit of *P. lucens* and would not be confused with that species.

Hagström considered *P. angustifolius* (*P. Zizii*) to be the hybrid *P. gramineus* × *lucens*, a belief held or suspected by many students of the genus. He cites specimens from North America but calls attention to the fact that ". . . many *Zizii*-like North American plants are not at all this hybrid, but of another origin, and great carefulness is necessary when considering these difficult forms."[1] If *P. lucens* does not occur in this country, the hybrid *P. gramineus* × *lucens* must be absent also. It may be suspected that the hybrid *P. gramineus* × *illinoensis* is not uncommon with us for it is known that each of these closely related species hybridizes with species of other subsections. Many intermediate forms occur, but it is usually difficult to determine which are the results of crossing and which are ecological variants of one or the other species.[2] The plants of the subsection *Lucentes*

[1] J. O. Hagström, Crit. Res. Pot. 216 (1916).

[2] See discussion under Hybridism.

fruit as freely as the average species of *Potamogeton*, and I think that nearly all of them must be considered to belong to one or the other of the two species.

The earliest specific name for the large-leaved plant is *P. illinoensis* Morong. This species has several variants, the recognition of which is made difficult in that ecological forms of one may simulate normal states of another. The *Lucentes* need to be studied cytologically and, until the hybrids having *P. illinoensis* as a parent are better understood, a grouping of the variants into varieties would be merely an artificial one. In order not to delay this treatment further, *P. illinoensis* is treated in the broad sense, including its many variations.

11. P. PRAELONGUS Wulfen

RHIZOME whitish, suffused or spotted with rusty red, as thick as the stem or often much thicker. STEM simple or branched, whitish or olive-green, often zigzag, 1.5–4 mm. in diameter; stele with the proto-type pattern; endodermis of U-cells; interlacunar and subepidermal bundles present; pseudo-hypodermis 1–3 cells thick. LEAVES all submersed, ovate-oblong, (5–) 10–20 (–36) cm. long, 1–3 cm. wide, 13–25 nerves, 3–7 of them more prominent than the others, cordate or rounded at base and clasping ⅓ or ½ the circumference of the stem; apex cucullate, splitting when pressed, or rounded; margin entire; lacunae of 2–4 rows of cells each side of the midrib. STIPULES white, nerves moderately strong, oblong to oblong-linear or ovate-lanceolate, rounded at apex, (3–) 5–10 cm. long, without keels, usually persistent and conspicuous. PEDUNCLES variable in thickness, clavate, (5–) 15–60 cm. long. SPIKES with 6–12 whorls, not crowded at anthesis, sometimes moniliform; in fruit 3–5 cm. long, 1.1–1.4 cm. thick. FLOWERS sessile or on pedicels up to .5 mm. long; sepaloid connectives greenish, blades orbicular or elliptical, (1.7–) 2–2.6 (–2.9) mm. wide, claws 1–2 mm. long; anthers 1–2 mm. long. FRUITS obovate, rounded on the back, cuneate at base, (4–) 4.3–5 mm. long (excluding beak), 3.2–4 mm. wide; beak prominent, short and thick; dorsal keel acute and strongly developed, especially upward; lateral keels rounded or none; exocarp dark green; endocarp with rounded lateral keels and a dorsal keel which is alate, thin and weak, beak linear, facial, about .8 mm. long, loop with a linear cavity; apex of seed pointing toward the basal end or slightly above. Plants characterized by large ovate-oblong leaves, cucullate at the tip, whitish stem, large conspicuous stipules, and with long peduncles bearing large fruits.

P. praelongus Wulf., Arch. Bot. Roem. **3:** 331 (1805); Benn., Journ. Bot. **19:** 241 (1881); Morong, Mem. Torr. Club **3:** no. 2: 32 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 96 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 22 (1909); Hagstr., Crit. Res. Pot. 250 (1916). *Spirillus praelongus* Nieuwl., Am. Midl. Nat. **3:** 17 (1913).

Deep, cold water, southern Labrador, Newfoundland, Gaspé Peninsula, Prince Edward Island, New England, and New Jersey, west to California, and north to Alberta, Mackenzie and the Aleutian Islands. Map 14. Eurasia. Reported from Mexico. The following, from a large series of specimens, are representative: Labrador: Trout P., Blanc Sablon R., Straits of Belle Isle (also on the Quebec side of the river), *Fernald & Long 27347.* Newfoundland: Cook Point, Pistolet Bay, *Fernald, Gilbert & Hotchkiss 27346;* Tilt Cove, northern shores of Notre Dame Bay, *Fernald, Wiegand & Darlington 4482;* Birchy Cove (Curling), Region of Humber Arm, Bay of Islands, *Fernald, Wiegand & Kittredge 2441;* Middle Birchy P., eastern drainage area of the Humber R. system, *Fernald & Wiegand 2444* (C, G, flaccid form); Morley's P., Humber Arm, Bay of Islands, *Fernald, Long & Fogg 1211;* Junction P., Whitbourne, Avalon Peninsula, *Fernald, Long & Dunbar 26223.* Quebec: Lac Pleureuse, Gaspé Co., *Fernald, Dodge & Smith 25423 & 25424;* West Branch of Mont Louis R., Gaspé Co., *Fernald, Dodge & Smith 25422;* Lac Sainte-Anne, Gaspé Co., *Victorin, Rolland & Jacques 33518;* New-Richmond, Bonaventure Co., *Victorin, Rolland & Jacques 33838;* Lac Porc-Épic, Saint-Fabien, Rimouski Co., *Rousseau 30004.* Prince Edward Island: Dundee, Kings Co., *Fernald, Long & St. John 6767;* French River, Queens Co., *Fernald, Long & St. John 6768.* New Brunswick: Woodstock, Aug. 1884, *Geo. U. Hay 4131.* Nova Scotia: Earltown Lakes, Aug. 10, 1883, *McKay 4129.* Maine: Houlton, Aroostook Co., 1881, *Furbish;* 5th Lake Musquacook, Piscataquis Co., *G. B. Rossbach 82;* St. John P., Somerset Co., *St. John & Nichols 2107;* Pushaw L., Orono, Penobscot Co., Aug. 1891, *Furbish;* Hammond P., Hampden, Penobscot Co., *Ogden & Steinmetz 1604;* Hermon P., Hermon, Penobscot Co., *Ogden, Babel & Kozicky 1880* (flaccid form); Pleasant P., Stetson, Penobscot Co., *E. C. & E. B. Ogden & F. H. Steinmetz 1882, Gray Exsic. no. 1105;* Androscoggin R., Livermore Falls, Androscoggin Co., 1894, *Furbish;* Torsey P., Kent's Hill, Readfield, Kennebec Co., 1892, *Furbish.* New Hampshire: Ladd P., Stewartstown, *Pease 14012;* Streeter's P., Lisbon, June 18, 1887, ex herb. *E. & C. E. Faxon;* Round P., Connecticut Lakes, *Kendall, Gouldsborough & Doolittle 17.* Vermont: Shelburne P., June 28, 1878, *Pringle;* Harvey's P., West Barnet, Sept. 7, 1885, *F. Blanchard;* Willoughby, Orleans Co., Aug. 31, 1904, *A. Lorenz.* Massachusetts: Chadwick's P., Essex Co.,

S. K. Harris 539; Pleasant L., Hamilton, Essex Co., *Fernald & Svenson 749;* Fresh P., Cambridge, Middlesex Co., *many collectors;* Harmon P., New Marlboro, Berkshire Co., June 29, 1912, *R. Hoffmann;* Stockbridge Bowl, Stockbridge, Berkshire Co., Aug. 9, 1914, *R. Hoffmann.* CONNECTICUT: Bantam L., Litchfield, Litchfield Co., July 25, 1883, *Morong;* Lake Saltonstall, Sept. 23, 1880, *E. & C. E. Faxon;* Twin Lakes, North Branford, New Haven Co., June 22, 1887, *E. B. Harger;* Twin Lakes, Salisbury, Litchfield Co., *Eames & Godfrey 8685.* NEW YORK: Southeast Bay, Saratoga L., Saratoga Co., *Muenscher & Lindsey 2819;* Dexter L., St. Lawrence Co., *Muenscher & Maguire 829;* Lake Placid, Essex Co., *Muenscher, Manning & Maguire 141;* Cayuga L., Tompkins Co., July 29, 1884, *Dudley;* Pierrepont P., inlet from Lake Ontario, Woodville, Jefferson Co., *House 10070;* Ballston L., Saratoga Co., *Muenscher & Clausen 4205.* NEW JERSEY: Swartswood L., Sussex Co., *Griscom & Mackenzie 10681.* ONTARIO: Lake Hannah, Nipigon R., July 21, 1884, *John Macoun;* Lake Scugog, *Wm. Scott 16451,* also *Cain 972;* Inner Long Point Bay, Lake Erie, *Cain 1050;* Almonte, July 6, 1898, *J. Fowler.* MICHIGAN: Isle Royale, *Cooper 312;* Lake Manganese, Copper Harbor, Keweenaw Co., *Hermann 8234;* Tahquamenon R., Luce Co., *Metcalf 2291;* Douglas L., Cheboygan Co., *Ehlers 533 & 1756,* also June, July 1924, *J. R. Swallen;* Fremont L., Newago Co., July 7, 1926, *Oosting;* Crystal L., Montcalm Co., *C. F. Wheeler 273;* Pine L., vicinity of Agr'l Coll., *C. F. Wheeler 10;* Haslet, *Yuncker 713;* Vicksburg, Kalamazoo Co., July 5, 1937, *F. W. Rapp;* Clear L., Jackson Co., *Hermann 6281.* OHIO: Put-in-Bay, July 16, 1898, *A. J. Pieters.* INDIANA: Bear L., Noble Co., *Deam 49394;* Wolf L., *Agnes Chase 1466;* Lake Maxinkuckee, *Scovell 45 & 66;* near Lake Maxinkuckee, *Scovell & Clark 1321.* WISCONSIN: Green Bay, 1892, *Schuette;* Twin Lakes, Marquette Co., *Uhler & Warren 1079;* Big Muskego L., Muskego Twp., Waukesha Co., *Hotchkiss & Koehler 4246;* Wind L., Norway Twp. Racine Co., *Hotchkiss & Koehler 4228;* Rice L., Nashville Twp., Forest Co., *Hotchkiss & Koehler 4340;* valley of the Wisconsin R., near Lac Vieux Desert, *L. S. Cheney 499;* Lauderdale, *Bebb 1009.* MINNESOTA: Burntside L., July 25, 1886, *L. H. Bailey;* Lake Itasca, Clearwater Co., *Grant 3029;* Swan L., *Hotchkiss & Jones 3928;* Center City, Chisago Co., July 1892, *B. C. Taylor;* Lake Chisago, *Metcalf 1229;* James L., Kandiyohi Co., *Metcalf 2387;* Geneva L., Freeborn Co., *Shunk & Manning 80;* German L., LeSueur Co., *Shunk & Manning 229;* Leaf L., Becker Co., *Shunk & Manning 368;* Christine L., Douglas Co., *Shunk & Manning 410;* Pelican L., Wright Co., *Linsdale & Keck 153,* also *Uhler & Warren 797½;* Child L., Cass Co., *Metcalf 2371;* Lake Johanna, Pope Co., *Keck & Stilwill 455.* IOWA: Clear L., Cerro Gordo Co., July 11, 1896, *B. Shimek.* NORTH

Dakota: Roland Twp., Turtle Mts., Bottineau Co., *Metcalf 522;* Pelican L., Turtle Mts., Bottineau Co., *Metcalf 546.* Nebraska: Hackberry L., Cherry Co., July 18, 1912, *Pool & Folsom;* Dewey L., near Valentine, *Tolstead 430;* Enders L., *Thomson 2.* Mackenzie: 2nd Eskimo L., 68° 10′ N., 132° 55′ W., Aug. 19, 1927, *A. E. & R. T. Porsild.* Alberta: Moose Lake district, Wood Buffalo Park, *Raup 1570 & 1571;* Murdock Creek district, Wood Buffalo Park, *Raup 1572.* Montana: Lower Two Medicine Lakes, *Maguire 485;* Lower St. Mary's L., *Maguire 486.* Idaho: Henry L., Fremont Co., *E. B. & L. B. Payson 2024;* Gray's L., *Sperry & Martin 696.* Wyoming: Swastika L., Medicine Bow Mts., Albany Co., *A. & R. A. Nelson 973,* also *R. J. Davis 378-W;* Heart L., Yellowstone Nat'l Park, *Clifford Richardson.* Colorado: Cottonwood L., *Shear 3804;* vicinity of Twin Lakes, July–Aug. 1902, *C. Juday;* Echo L., s. w. of Idaho Springs, Clear Creek Co., *Ehlers 7957.* Utah: Panguitch L., *M. E. Jones 6023,* Fish L., Fish Lake Forest, July 23, 1922, *S. B. Locke;* Posey L., 14 mi. n. of Escalante, Garfield Co., Sept. 3, 1936, *Geo. Piranian.* California: Webber L., Sierra Co., Aug. 1894, *Dudley;* Lassen's Peak, July 1879, *Mrs. R. M. Austin.* Oregon: Wallowa L., *Cusick 2484;* Klamath marsh, Klamath Indian Reservation, *Coville 1254.* Washington: Wiser L., Whatcom Co., *Muenscher 7647;* Lake Leland, Jefferson Co., *Otis 1767.* British Columbia: Langford L., Vancouver I., *John Macoun 4132a & 88257;* Beaver L., near Victoria, *John Macoun 88258 & 88259.* Alaska: Atka, Aleutian Islands, *Eyerdam 948 & 1122.*

P. praelongus is a beautiful species with large bright green oblong leaves, and it often has extremely long peduncles terminated by huge spikes with massive fruit. It can scarcely be mistaken for any other species. Bennett[1] quotes remarks from Morong to the effect that this species fruits very late (Nov. to Dec.). However, specimens in herbaria with fruit are mostly collected in July and August. Robinson and Fernald say, "Fruiting in June and July, withdrawing the stems to deep water to mature the fruit,"[2] and this seems to be the case. More June collections of this plant are desirable. An extremely flaccid form (forma *elegans* Tiselius) was collected in Newfoundland by Fernald and Wiegand (*Fern. & Wieg. 2444*); one much like it grows in Hermon P., Maine (*Ogden, Babel & Kozicky* 1880).

12. P. Richardsonii (Bennett) Rydberg

Rhizome whitish, yellowish or pinkish, not spotted; scales blackish, rounded at apex. Stem often branched, unspotted,

[1] Arthur Bennett, Journ. Bot. 19: 241 (1881).
[2] Robinson & Fernald, Gray's Man. ed. 7: 74 (1908).

1–2.5 mm. in diameter; stele with the trio-type pattern, the phloem on the inner face of the trio-bundle appearing as 2 patches; endodermis of O-cells; interlacunar and subepidermal bundles absent; pseudo-hypodermis 1 cell thick, at least partly so. LEAVES all submersed, coarse, mostly ovate-lanceolate, often ovate at the lower part of the stem and becoming narrowly lanceolate above, (1.5–) 3–10 cm. long, (.5–) 1–2 cm. wide, nerves (7–) 17–29 (–33), all rather prominent, 3–7 of them more prominent than the others, cordate at base and clasping ½ or ¾ the circumference of the stem; apex acutish but never sharp-pointed, sometimes rounded; margin with fugacious 1-celled translucent denticles, which are usually more or less appressed, lacunae of 2 or 3 rows of cells each side of the midrib. STIPULES whitish, coarsely nerved, ovate to lanceolate, obtuse when young, 1–2 cm. long, without keels, early disintegrating into whitish fibers. PEDUNCLES at base about same thickness as stem, often clavate, 1.5–25 cm. long. SPIKES with 6–12 whorls, not crowded at anthesis, sometimes moniliform; in fruit 1.5–4 cm. long, and about 1 cm. thick. FLOWERS sessile or on pedicels up to .5 (–1) mm. long; sepaloid connectives greenish, blades orbicular or elliptical, (1.3–) 1.4–2 (–2.3) mm. wide, claws usually 1–1.5 mm. long; anthers (.8–) 1.1–1.3 (–1.4) mm. long. FRUITS obovate, rounded on the back and at the base, sides plump or with a shallow depression, (2.5–) 2.7–3.2 (–3.5) mm. long (excluding beak), (2–) 2.3–2.6 (–3) mm. wide; beak prominent, up to 1 mm. long; keels rounded or none, rarely acutish; exocarp usually gray-green or olive-green; endocarp with rounded keels, beak linear, facial, about .8 mm. long, loop with a cavity, or at least a weak area; apex of seed pointing toward the basal end or slightly above. Plants characterized by numerous coarsely-nerved perfoliate submersed leaves, with stipules persistent as whitish fibers.

P. Richardsonii (Benn.) Rydb., Bull. Torr. Club **32:** 599 (1905). *P. perfoliatus* var. *lanceolatus* Robb. in Gray, Man. ed. 5: 488 (1867); not Blytt (1861). *P. perfoliatus* var. *Richardsonii* Benn., Journ. Bot. **27:** 25 (1889); Morong, Mem. Torr. Club **3:** no. 2: 33 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 95 (1907). *P. perfoliatus* L. sensu Taylor, N. Am. Fl. **17:** pt. 1: 22 (1909), in part; sensu Hultén, Fl. Alaska & Yukon 101 (1940). *P. perfoliatus* var. *gracilis* sensu Fernald in Porsild, RHODORA **41:** 176 (1939). *Spirillus perfoliatus* var. *Richardsonii* (Benn.) Nieuwl., Am. Mid. Nat. **3:** 17 (1913). *P. perfoliatus* ssp. *Richardsonii* Hultén, Fl. Alaska & Yukon 102 (1940).

Deep water of lakes and rivers, Labrador, Quebec, northern Maine, Vermont and western Massachusetts, west to Utah and California, north to British Columbia, Mackenzie, Alaska and the Aleutian Islands. MAP 15.

(To be continued)

THE BROAD-LEAVED SPECIES OF POTAMOGETON OF NORTH AMERICA NORTH OF MEXICO

E. C. Ogden

(*Continued from page 163*)

The following, selected from a very large series of specimens, are representative: Labrador: Grand Falls of Hamilton R., *Doutt 3323*. Quebec: Lake Mistassini, *J. M. Macoun 3055;* Lac au Saumon, Matane Co., *Svenson & Fassett 3045;* Roberval, July 16, 1892, *Kennedy;* Lac William, near St. Ferdinand, *Louis-Marie, Laporte & Dudemaine 501;* Odanak, Yamaska Co., *Adrien 1806;* Longueuil, Chambly Co., *Victorin 18462,* also *Rolland 43354, 43355, 43356 & 43481;* Isle-aux-Noix, Richelieu R., *Victorin 8179.* Maine: Beau Lac, valley of St. Francis R., Aug. 14, 1902, *Eggleston & Fernald;* Fish River Lake, Aroostook Co., *Ogden 1717;* Round P., Aroostook Co., *Fellows 2007;* Cross L., Aroostook Co., *Fellows 4887.* Vermont: Lake Champlain, Orwell, Addison Co., *Cushman 6009;* Big Otter Creek, Ferrisburgh, Aug. 12, 1887, *Morong;* Ferrisburg, Aug. 16, 1896, *Eggleston;* Swanton, Franklin Co., *Blewitt 2137;* mouth of Winooski R., Burlington, Chittenden Co., Aug. 30, 1903, *N. F. Flynn,* also *Blake 2308;* Rescue L., Ludlow, Windsor Co., July 12, 1906, *Burnham.* Massachusetts: Pontoosuc L., Lanesboro, Berkshire Co., Sept. 9, 1915, *J. R. Churchill;* Mill R., New Marlboro, Berkshire Co., July 24, 1912, *R. Hoffmann.* New York: Muskalonge Bay, Lake Ontario, Jefferson Co., *Muenscher & Maguire 1782;* Salmon R., Selkirk, Oswego Co., *Fernald, Wiegand & Eames 14087;* Rapids above Niagara Falls, Aug. 21, 1886, *Morong;* Tioughnioga R., Cortland, Cortland Co., *E. L. Palmer 50;* Silver L., Perry, Wyoming Co., *Burkholder & Muenscher 16424;* Myers Point, Lansing, Tompkins Co., *Jones & Hoffmann 7467;* Cayuga L., July 15, 1879, and Aug. 28, 1884, *Dudley,* also Aug. 15, 1893, *Hermann von Schrenk,* also *Muenscher & Bechtel 459;* Bemus Point, Lake Chautauqua, Aug. 8, 1896, *J. R. Churchill;* Shushan, *Dobbin 1072 & 1327.* Pennsylvania: Brandywine Creek, Chester Co., no date, ex Herb. *Wm. M. Canby* (F, on a sheet with *P. perfoliatus* var. *bupleuroides;* perhaps the label refers only to *P. perf.* v. *bup.*). Ontario: Spawning L., Temagami Forest Reserve, *Cain 1051;* Lake Nipissing, *Chitty 306;* Agawa R., Lake Superior, *Pease 17983;* Lake Hannah, Nipigon R., July 21, 1884, *John Macoun;* Mississippi R., Galetta, Carleton Co., *Ogden & Bolan 1631;* Hay Bay, Tobermory, Bruce Co., *Krotkov 7041;* Golden L., Renfrew Co., *Macoun 22176.* Michigan: Ontonagon R., 1862, *J. W. Robbins;* Sault Ste. Marie, Aug. 6, 1881, *E. J. Hill,* also Aug. 25, 1882, *Morong;* Lake George, Homestead, Sugar Island, Chippewa Co., *Hermann 7153 & 7224;* Douglas L., Cheboygan Co., *Gates 258;* Lake Charlevoix,

Ironton, Charlevoix Co., *Ogden & Bolan 1678;* Thread P., Flint, Aug. 11, 1909, *Sherff;* Detroit R., *Gillman 65;* Black L., Ottawa Co., July 14, 1926, *Oosting.* Ohio: Sandusky Bay, Sept. 2, 1898, *E. L. Mosely;* Painesville, Aug. 21, 1887, herb. *W. C. Werner,* also *Biltmore Herbarium 688.* Indiana: Wolf L., Whiting, Lake Co., *Deam 55274A;* Hamilton L., Hamilton, Steuben Co., *Deam 56686;* Long L., Wolcottville, Lagrange Co., Aug. 20, 1930, *Johnson & Myers;* Culver Bay, *Scovell & Clark 1057;* Lake Maxinkuckee, *Scovell 27a,* also *Evermann 1057.* Wisconsin: University Bay, Lake Mendota, Aug. 19, 1912, *R. H. Denniston;* KaKagan R., Ashland Co., *L. S. Cheney 4919;* Port Wing, Bayfield Co., *Fassett 7535;* Oshkosh, 1877, *W. A. Kellerman;* State House, Trout Lake, Vilas Co., *Fassett 9061;* Green Bay, July 28, 1891, *Schuette.* Illinois: Calumet L., Chicago, *Chase 1421;* Lake Michigan, Chicago, Aug. 1860, *Dr. Scammon.* Manitoba: Brandon, *Macoun 16459.* Minnesota: Knife R., Lake Co., *Pease & Bean 26389;* Lake Itasca, Clearwater Co., *Grant & Oosting 3206;* Lake Augusta, Arno Twp., Cottonwood Co., *Hotchkiss & Jones 3976;* Wheeler L., Kandiyohi Co., *Metcalf 2124;* Center City, July 1892, *B. C. Taylor;* Swan L., Nicollet Co., July 1892, *C. A. Ballard,* also *Metcalf 9;* Chisago L., *Metcalf 1145 & 1176;* Rice L., Aitkin Co., *Metcalf 1463;* Lake Koronis, Stearns Co., *Metcalf 1390,* also *Kubichek 109;* Glacier L., Murray Co., *Metcalf 1839;* Linwood L., Anoka Co., *Kubichek 17;* German L., Le Sueur Co., *Shunk & Manning 220;* Mille Lacs L., Mille Lacs Co., *Keck & Stevens 323;* Lake Stewart, Otter Tail Co., *Oosting 302;* Lake Minnetonka, Navarre, *Oosting 2971.* Iowa: Clear L., Cerro Gordo Co., July 11, 1896, *B. Shimek;* Spirit L., Dickinson Co., July 31, 1896, *B. Shimek;* L. Okoboji, July 1888, *A. S. H.;* Estherville, July 1881, *R. I. Cratty.* North Dakota: Fish L., Bottineau, July 25, 1896, *M. A. Brannon;* St. Mary's L., Valley City, *Mabbott 251 & 252;* Leeds, Benson Co., July 29, 1899, July 24, 1900, July 22, 1906, July 31, 1907 & July 16, 1913, *Lunell;* Pelican L., Turtle Mts., Bottineau Co., *Metcalf 547;* Rush L., Cavalier Co., *Mabbot 500;* L. Wamtah, Foster Co., *Mabbot 350;* Jim L., Pingree, *Mabbot 317.* South Dakota: Lake Hendricks, June 20, 1891, *T. A. Williams;* Lake Campbell, July 4, 1893, *T. A. Williams;* Pickerel L., Day Co., *Over 14460 & 17134;* Clear L., Marshall Co., *Over 17137;* Clear L., Deuel Co., *Over 3366;* Big Stone L., Aug. 26, 1892 & Aug. 10, 1895, *T. A. Williams* (G, NY, S, narrow-leaved form); Big Stone L., Roberts Co., *Over 14464* (US, narrow-leaved form); Big Stone L., Grant Co., *Over 3367* (US, semi-narrow-leaved form); Sand L., *Griffiths 6* (F, G, semi-narrow-leaved form). Nebraska: Dewey L. near Valentine, *Tolstead 429 & 473;* 3 miles n. w. of Whitman, Grant Co., *Rydberg 1792;* Enders L., *Thomson 5;* Crescent L., *Thomson 299;* Shafer L., Garden Co., *Uhler & Martin 1659;* Lake Manawa,

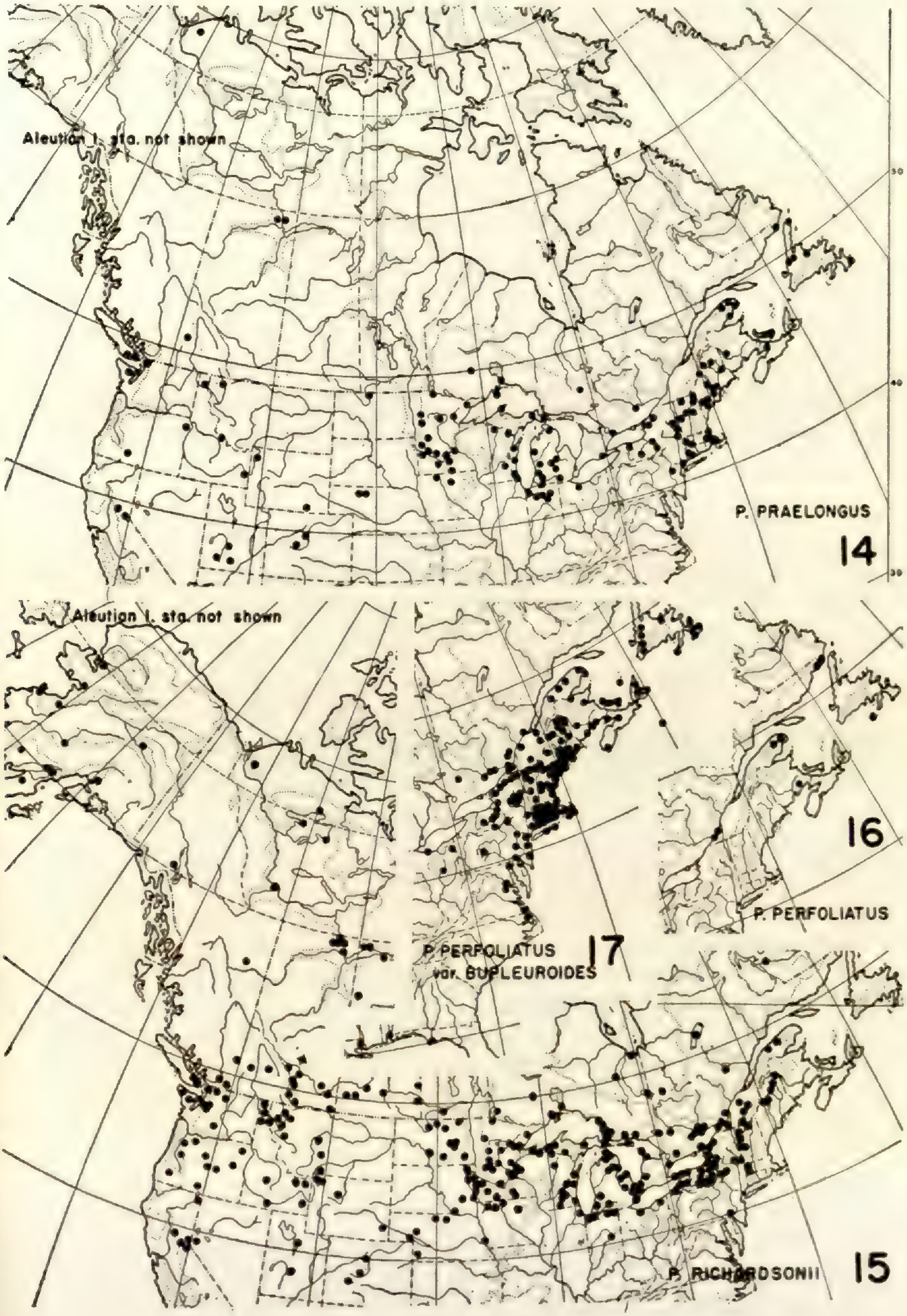
Omaha, *Amy C. Lawton 53* (F, semi-narrow-leaved form). MACKENZIE: Setidge L., Aug. 21, 1927, *A. E. & R. T. Porsild 3098;* Conquerors Bay, Aug. 15, 1928, *A. E. & R. T. Porsild;* Big Point, Aug. 24, 1928, *A. E. & R. T. Porsild.* SASKATCHEWAN: Yorkton, *Macoun & Herriot 76872;* Eagle L., *Macoun & Herriot 86871;* Methye L., *J. M. Macoun 4368;* near mouth of McFarlane R., Lake Athabasca, *Francis Harper 98;* Cornwall Bay, Lake Athabasca, *Raup 6617.* ALBERTA: Bow River Valley, *Stewardson Brown 694;* near Banff, *Macoun 4383;* Vermilion Lakes, Banff, *John Macoun 4380,* also *Malte & Watson 960,* also *McCalla 2370;* near Chipewyan, n. shore of Lake Athabasca, *Laing 147;* also *Raup & Abbe 4666.* MONTANA: Missoula Valley near Frenchtown, *S. Watson 397;* Flathead L., Polson, Flathead Lake Co., *Muenscher 10218;* Flat Top L., *Maguire 488;* Lower Two Medicine Lakes, *Maguire 495;* Swift Current Ridge L. (Bath Tub), *Maguire 490;* Trout L., Glacier National Park, *Maguire & Piranian 5440;* Midvale, *Umbach 433;* Big Fork, *MacDougal 805.* IDAHO: Lake Pend Oreille near Hope, *Sandberg, MacDougal & Heller 956;* Clarks Fork Valley below Weeksville, *Leiberg 1574;* Blackfoot R., Trail Ranger Station, Bannock Co., *Eggleston 9974;* Henry L., Fremont Co., *E. B. & L. B. Payson 2023;* Mud L., *Sperry & Martin 671;* Snake R., St. Anthony, *Merrill & Wilcox 863;* Portneuf R., McCammon, Bannoch Co., *Ray J. Davis 328–37;* Alturus L., *Evermann 492.* WYOMING: Goose Creek L., *Aven Nelson 2276;* Laramie R., *Elias Nelson 87 & 3362;* Lewis L., Yellowstone region, 1878, *C. Richardson;* N. Yellowstone L., *Tweedy 413.* COLORADO: vicinity of Twin Lakes, July–Aug. 1902, *C. Juday;* Tomichi R., Parlin, Gunnison Co., Aug. 20, 1901, *Benjamin H. Smith;* Kremmling, Grand Co., *Beetle 1462.* UTAH: Lehi, Aug. 1883, *M. E. Jones;* Fish L., *M. E. Jones 5788,* also *Rydberg & Carleton 7522.* NEVADA: Truckee R., *Sereno Watson 1135.* CALIFORNIA: Pit R., at Lookout, Modoc Co., Aug. 24, 1899, *M. S. Baker;* Webber L., Sierra Co., Aug. 1894, *Dudley;* Big Meadows, Plumas Co., *Mrs. R. M. Austin 575;* Feather R., *Mrs. R. M. Austin 1177;* Truckee R., alt. 4000 ft., *W. W. Bailey 1135.* OREGON: Des Chutes R., Lupine, Crook Co., *Peck 9619;* Ten-Mile L., near Lakeside, Coos Co., *Peck 9009;* Willamette R., Salem, *Hall 489 & 490;* Willamette R., June 1890, *Drake & Dickson,* also *Henderson 1009;* Strawberry L., Blue Mts., *Cusick 3620;* U. S. R. S. Main Canal, Klamath Falls, Klamath Co., *Applegate 3416;* Laidlaw, Crook Co., *Kirk & Whited 3141.* WASHINGTON: Lake Washington, Mercer Island, King Co., *J. W. Thompson 7594;* Lake Whatcom, Whatcom Co., *Muenscher 7653;* Seattle, June 26, 1889, *E. C. Smith 757,* also Aug. 1892, *C. V. Piper;* Quiniault, *Conard 318;* Prosser, Yakima Co., *Cotton 809;* Stevenson's Ranch, Lake Chelan, *Gorman 677;* Lake Sammamish, King Co., *Otis 1678;* also Aug.

30, 1936, *G. N. Jones.* British Columbia: Sicamous, *John Macoun 4127;* Sumas L., Chilliwack Valley, *J. M. Macoun 26817;* Cowichan L., Vancouver Island, *J. T. Howell 7679;* Shuswap L., *J. M. Macoun 3049;* Howser L., *Shaw 771 & 777;* Kamloops, *John Macoun 3048.* Yukon: Lewis R., Lat. 60°, Sept. 6, 1887, *Dawson 3046.* Alaska: Unalaklet, *A. E. & R. T. Porsild 1102;* Votlik, June 10–14, 1926, *A. E. & R. T. Porsild;* Pastolik, July 16–20, 1926, *A. E. & R. T. Porsild;* Holy Cross, July 5, 1926, *A. E. & R. T. Porsild;* False Pass, Unimak Island, Aleutian Islands, *Eyerdam 2156;* Fairbanks, *L. J. Palmer 1862;* Ankow R., *Piper 4430;* Matanuska, *J. P. Anderson 838 & 1522;* Pyramid Creek, Unalaska, *Jepson 238;* Selawik L., *L. J. Palmer 638* (US, mixed with *P. gramineus* var. *maximus*); Chuletna R., Lake Iliamna, *Gorman 233;* Naknek L., Point no. 795, Katmai Region, Alaska Pen., July 22, 1919, *A. E. Miller;* Kotlik, Yukon R. delta, *A. E. & R. T. Porsild 847.*

P. Richardsonii is closely related to *P. perfoliatus* and is considered by many to be merely a variety or state of that species. Often, on vegetative characters alone, the two species are difficult to distinguish, but with fruiting specimens there is never any question. The larger fruit, borne on clavate peduncles, and always with a cavity in the endocarp loop, is quite distinctive from that of *P. perfoliatus.* In the western part of its range, this plant exhibits the characteristic ovate-lanceolate leaves with the strong white stipule-fibers, and only in the region east of New York state do its leaves and stipules approach those of *P. perfoliatus.* As intermediate specimens are nearly always sterile and scarcely found except where the ranges of *P. Richardsonii* and *P. perfoliatus* var. *bupleuroides* overlap, it is reasonable to suppose that they are hybrids of these two closely related plants.

In many respects *P. Richardsonii* is intermediate between *P. praelongus* and *P. perfoliatus* and Hagström suggested that it "has arisen by cooperation between these two species."[1] It is however a fertile species (for a *Potamogeton*) and with its greatest development falling outside the range of *P. perfoliatus* it certainly cannot be considered a recent hybrid. The anatomy of its stem is exactly that of *P. perfoliatus* and strikingly different from that of *P. praelongus.* It would seem that if *P. praelongus* were involved in its origin it would retain some of the fundamental anatomical characteristics of that species, especially the

[1] J. O. Hagström, Crit. Res. Pot. 254 (1916).



RANGES OF POTAMOGETON

cortical bundles and a tendency to the prototypic stele. It would seem more logical to suppose that *P. praelongus* evolved from a *perfoliatus*-like ancestor, with *P. Richardsonii* as an intermediate step, except that *P. Richardsonii* is confined to North America (reported from Scotland[1]), while both *P. perfoliatus* and *P. praelongus* have a much wider distribution. Also such a postulate would involve the development of a proto-type stelar pattern from a trio-type pattern. The fossil record is of little or no help here, for both *P. perfoliatus* and *P. praelongus* appear for the first time in the Amber flora (Upper Eocene or Lower Oligocene) of Denmark,[2] and *P. Richardsonii* is not distinguished from *P. perfoliatus* in fossil literature. In America, members of the perfoliate-leaved species are reported only from the Pleistocene, near Ottawa, Canada.[3]

A narrow-leaved form of *P. Richardsonii* is found in Big Stone Lake, between northern South Dakota and Minnesota. It was collected there by T. A. Williams in 1892 and in 1895 and by W. H. Over in 1922 (no. 14464). Another collection from the same lake (*Over* 3367) and collections from Sand Lake, South Dakota (*Griffiths* 6) and Lake Manawa, near Omaha, Nebraska (*Lawton* 53) appear to be nearly the same thing, and several other collections approach it. This form might be considered a variety were it not that typical *P. Richardsonii* frequently produces narrow-leaved branches, especially in deep or moving water.

13. P. perfoliatus Linnaeus

Rhizome whitish or pinkish, not spotted. Stem terete, .4–2 mm. in diameter, often much branched; stele with the trio-type pattern, the phloem on the inner face of the trio-bundle usually appearing as 2 patches; endodermis of O-cells; interlacunar and subepidermal bundles absent; pseudo-hypodermis 1 cell thick, at least partly so. Leaves all submersed, delicate, orbicular to ovate-lanceolate, usually ovate, 1–6 (–7) cm. long, .5–3 cm. wide, nerves 7–21, not strongly developed, only 1–7 of them prominent, cordate at base and clasping about ¾ the circumference of the stem; apex rounded or at least broadly obtuse; margin with fugacious 1-celled translucent denticles which are usually divergent, lacunae of 1–3 rows of cells each side of the midrib.

[1] Arthur Bennett, Journ. Bot. **19**: 241 (1881).
[2] N. Hartz, Danmarks geologiske Untersogelse, **2**: no. 20: 121 (1909).
[3] J. W. Dawson, Can. Nat. n. ser., **3**: 72 (1868).

STIPULES delicate, membranous, translucent, often appressed to the stem and seemingly a part of it, fugacious, ovate-oblong, rounded at apex, .4–2 cm. long, without keels. PEDUNCLES about same thickness as stem, 1–9 cm. long. SPIKES with 2–8 whorls, not crowded at anthesis, sometimes moniliform; in fruit 1–2 cm. long, and about .8 cm. thick. FLOWERS sessile or on short pedicels up to .5 mm. long; sepaloid connective greenish, blades orbicular or elliptical, (1.2–) 1.4–1.9 (–2.3) mm. wide, claws .7–1.3 mm. long; anthers (.7–) .9–1.2 (–1.3) mm. long. FRUITS obovate, rounded on the back and at base, sides plump when mature, (2.3–) 2.5–2.7 (–3) mm. long (excluding beak), (1.7–) 2–2.1 (–2.3) mm. wide; beak usually prominent, up to .7 mm. long; keels rounded or none; exocarp usually gray-green or olive-green; endocarp with rounded keels, beak linear, facial, about .5 mm. long, loop solid; apex of seed pointing toward the basal end. Plants characterized by numerous, ovate, perfoliate, submersed leaves, with delicate weakly-nerved fugacious stipules.

Two varieties differing only in size but strongly marked as to their extreme variation:

Stem 1–2 mm. in diameter; leaves 1.5–3 cm. wide, 11–21 nerves, 5–7 of them prominent ..... 13a. var. *typicus*.
Stem .4–1.5 mm. in diameter; leaves .5–2 cm. wide, 7–17 nerves, 1–5 of them prominent ..... 13b. var. *bupleuroides*.

13a. P. PERFOLIATUS L. var. **typicus**

P. perfoliatus L., Sp. Pl. **1:** 126 (1753); Morong, Mem. Torr. Club **3:** no. 2: 33 (1893), in small part; Graebn. in Engler, Pflanzenr. **4:** fam. 11: 92 (1907), in part; Taylor, N. Am. Fl. **17:** pt. 1: 22 (1909), in small part; Hagstr., Crit. Res. Pot. 254 (1916). *P. perfoliatus* var. *gracilis* Am. auth., in part; perhaps C. & S., Linnaea **2:** 190 (1827). *Spirillus perfoliatus* Nieuwl., Am. Mid. Nat. **3:** 17 (1913).

Rivers and lakes, southern Labrador, Quebec, and New Brunswick. MAP 16. Eurasia, northern Africa, Australia. The following are referred here: LABRADOR: Blanc Sablon R., Straits of Belle Isle (also on the Quebec side of the river), *Fernald, Wiegand & Long 27348;* Blanc Sablon R., Straits of Belle Isle, *Fernald & Wiegand 2450.* QUEBEC: Blanc Sablon R., Brest, Saguenay Co., *St. John 90087;* Blanc Sablon R., Blanc Sablon, Saguenay Co., *Lewis 130397;* Lac Pleureuse, Gaspé Co., *Fernald, Dodge & Smith 25421;* L'Ile Plate, Longueuil, near Montreal, *Victorin 20454.* NEW BRUNSWICK: Kennebecasis R., Lakeside, Kings Co., *Svenson & Fassett 933.*

13b. P. PERFOLIATUS L. var. BUPLEUROIDES (Fernald) Farwell

P. bupleuroides Fern., RHODORA **10:** 46 (1908); Hagstr., Crit. Res. Pot. 258 (1916). *?P. crispus* sensu Darlington, Fl. Cestr.

23 (1826); not L., Sp. Pl. **1:** 126 (1753). *P. perfoliatus* sensu Morong, Mem. Torr. Club **3:** no. 2: 33 (1893), in great part; sensu Graebn. in Engler, Pflanzenr. **4:** fam. 11: 92 (1907), in part; sensu Taylor, N. Am. Fl. **17:** pt. 1: 22 (1909), in part. *P. perfoliatus* var. *bupleuroides* Farw., Am. Mid. Nat. **8:** 264 (1923).

Brackish or fresh ponds and quiet rivers, Newfoundland to Florida, west to Ontario, Ohio, and Louisiana, common only in the northeastern part of its range. Map 17. Also Guatemala (Lake Atitlan, 1906, *C. M. Barber*) and probably elsewhere in Central America. The following are selected from a large series of specimens: Newfoundland: Killigrew's, Conception Bay, Avalon Peninsula, *Fernald & Wiegand 4484;* Holyrood, *Robinson & Schrenk 207* (G, type of *P. bupleuroides,* C, F, M, NY, US, isotypes); near Frenchman's Cove, Bay of Islands, *Mackenzie & Griscom 10049;* St. Georges, *Fernald, Wiegand & Kittredge 2451;* Highlands P., Crabbes, *Kennedy 551;* Topsail, *Williamson 472.* St. Pierre et Miquelon: Miquelon, *Louis Arsène 40 & 43.* Quebec: Percé, *Victorin, Brunel, Rolland & Rousseau 17286;* Newport, Gaspé Co., *Victorin, Rolland & Jacques 44467;* Dartmouth R., Gaspé Co., *Collins, Fernald & Pease 5578;* Saint-Augustin, Portneuf Co., *Victorin, Rolland & Jacques 33879;* St. Lawrence R., St. Vallier, Bellechasse Co., *Svenson & Fassett 3031;* Ile Plate, St. Lawrence R., Longueuil, *Victorin 8178 & 20456;* near Ottawa, *Victorin 10104.* Magdalen Islands: Cap-aux-Meules, Ile de l'Étang-du-Nord, *Victorin & Rolland 9924;* Étang-du-Nord wharf, Grindstone Island, *Fernald, Long & St. John 6771.* Prince Edward Island: Tignish, *John Macoun 3043;* Lower Sea Cow P., Prince Co., *Fernald, Long & St. John 6770;* Black P., Kings Co., *Fernald, Bartram, Long & St. John 6769.* New Brunswick: Restigouche R., Restigouche Co., *Svenson & Fassett 932;* Nipisiquit R., Bathurst, Gloucester Co., *Blake 5483;* St. John R., Westfield, Kings Co., *Fernald 1610 & 1611;* also *Fassett 2148;* Bass R., Kingston, Aug. 13, 1874, *J. Fowler.* Nova Scotia: South Ingonish, Cape Breton Island, *Nichols 694;* Mira Bay, Cape Breton Island, *Macoun 20756;* Bevis Brook, Port Bevis, Victoria Co., *Fernald & Long 19694;* Salmon R., Truro, Colchester Co., *Bean & White 19696;* Truro, Colchester Co., *Prince & Atwood 1405;* Port Clyde, Shelburne Co., *Fernald & Long 23143;* Midway (Centreville) L., Centreville, Digby Co., *Graves & Linder 19693;* Sable Island, *St. John 1124.* Maine: Mattawamkeag L., Island Falls, Aroostook Co., Sept. 7, 1897, *Fernald;* also *Pease & Hopkins 22692;* also *Steinmetz 374;* Pushaw P., Glenburn, Penobscot Co., *Ogden & Steinmetz 1544;* Bradley, July 29, 1905, *Ora Knight;* Souadabscook Stream, Hampden, Penobscot Co., *Fernald & Long 12392;* Eagle L., Piscataquis Co., *Ogden 1701;* Indian P., St. Albans, Somerset

Co., *E. C. & E. B. Ogden 2008;* South Paris, Oxford Co., 1897, *Furbish;* Roque Bluffs, Washington Co., Aug. 6, 1932, *Knowlton;* Mt. Desert I., Hancock Co., many collectors; Winterport, Waldo Co., *Rossbach 77;* Thomaston, Knox Co., Aug. 15, 1913, *E. B. Chamberlain;* also Aug. 14, 1915, *A. H. Norton;* Sheepscot R., Alna, Lincoln Co., *Fassett 456;* Sydney, Kennebec Co., *Fernald & Long 12391;* Topsham, Merrymeeting Bay, Sagadahoc Co., *Steinmetz 526;* Scarboro, Cumberland Co., *Fellows 4679;* Old Orchard, York Co., *Fernald 1612;* also *Chamberlain & Knowlton 571;* also *Parlin 1073;* also *Fellows 2966.* New Hampshire: Connecticut R., Northumberland, Coös Co., *Pease 12143;* Melvin, Merrimack Co., Aug. 15, 1904, *M. A. Day;* also *Sargent 29;* Rye Beach, Rockingham Co., Aug. 24, 1886, *Walter Deane;* Smith R., Danbury, Merrimac Co., Aug. 23, 1933, *Charles Bullard;* Rollinsford, *Hodgdon 11.* Vermont: Maidstone, Essex Co., *Sanford 1225;* Willoughby L., Aug. 31, 1917, *E. J. Winslow;* Missisquoi R., Swanton, Franklin Co., *Blewitt 4319;* Missisquoi R., Sheldon, Franklin Co., *Blewitt 4320;* Pelot's Bay, Lake Champlain, Aug. 2, 1899, *Nellie F. Flynn;* also *Carpenter 6069;* Winooski R., Essex Junction, Chittenden Co., *Blake 2212;* Winooski R., Montpelier, Washington Co., *Svenson & Fassett 3040.* Massachusetts: Chadwick's P., Haverill, Essex Co., *Harris 540;* Mystic P., Medford, Middlesex Co., many dates, *Morong;* Fresh P., Cambridge, Middlesex Co., many collectors; Wareham, Plymouth Co., *Svenson & Smith 822;* Mashpee, Barnstable Co., *Fogg 3606;* Tashmoo L., Tisbury, Dukes Co., Marthas Vineyard, *Seymour 1027;* Marthas Vineyard, *McAtee 1060;* Washing P., Nantucket Island, *Bicknell 118;* also Sept. 8, 1909, *J. R. Churchill;* Congamond P., Southwick, Hampden Co., *Seymour 267;* Horse P., Westfield, Hampden Co., *Markert 76909;* Housatonic R., Stockbridge, Berkshire Co., Aug. 20, 1902, *R. Hoffmann.* Rhode Island: Roger Williams Park L., Providence Co., July 23, 1908, *T. Hope;* Little Compton, Newport Co., *Sanford 10192;* Wash P., Block Island, Newport Co., *Fernald, Hunnewell & Long 8445.* Connecticut: Selden's Cove, Lyme, New London Co., Sept. 6, 1911, *E. B. Harger;* Paton Brook, Southington, Hartford Co., Aug. 28, 1900, *C. H. Bissell;* Fenwick, Middlesex Co., Sept. 2, 1884, *C. Wright;* East Haven, New Haven Co., *Blewitt 1677 & 1978;* Pistapaug P., Wallingford, New Haven Co., *Blewitt 3651;* Ash Creek, Fairfield, July 6, 1895, *E. H. Eames.* New York: White Creek, De Kalb, *Phelps 1092 & 1655;* Rockland L., Rockland Co., *Muenscher & Curtis 5436;* Onondaga L., Aug. 1, 1890, *L. M. Underwood;* Schroon L., Warren Co., *Muenscher & Lindsey 2728;* Round L., Saratoga Co., *Muenscher & Clausen 4210;* n. of Canoga Marshes, Cayuga L., Seneca Co., *Eames & Wiegand 9102;* Riverhead, Southampton, Suffolk Co., *St. John 2542.* New Jersey: Mantoloking, Ocean Co., *Edwards*

& Clausen 1400; Barnegat Bay, 1852, *O. R. Willis;* New Durham, July 21, 1864, *W. H. Leggett;* Hackensack R., Oradell, Oct. 10, 1891, *Morong;* Swartswood L., Sussex Co., *Griscom & Mackenzie 10680.* PENNSYLVANIA: Delaware R., Bushkill, Pike Co., Aug. 4, 1918, *E. B. Bartram* (G). DELAWARE: Brandywine, Wilmington, Aug. 17, 1896, *A. Commons* (M, NY). MARYLAND: off mouth of Mill Creek, Chesapeake Bay Region, *Shull 96;* Carroll Island, *Coville 114 & 118;* Oxon Run, *Tidestrom 7175;* Pomonkey Creek near Potomac R., June 24, 1906, *Tidestrom;* Rock Point, Charles Co., *Leonard & Killip 863.* VIRGINIA: Four Mile Run, Chesapeake Bay Region, *Shull 469;* Four Mile Run, Alexandria, Sept. 23, 1903 *Tidestrom;* Aquia Creek, Aug. 12, 1930, *Hugh O'Neill;* Dyke, Fairfax Co., *Metcalf & Sperry 1603;* Back Bay, Long Island, Princess Anne Co., *Fernald & Long 10873* (locally called "Red-top"). NORTH CAROLINA: North Channel, Currituck Sound, *Shull 456* (G, M, NY, US). FLORIDA: Apalachicola, no date, herb. *Chapman* (G, NY). ONTARIO: Almonte, July 7, 1898, *J. Fowler* (F); Cache L., Algonquin Park, *Macoun 22227* (C, not typical). OHIO: Put-in-Bay, Aug. 1898, *A. J. Pieters* (US); Ohio Canal near Roscoe, *J. L. Riddell* (G, US). ALABAMA: Mobile, July 1884, *C. Mohr* (S, US). LOUISIANA: Chifuncte Lighthouse, Lake Ponchartrain, Aug. 16, 1838, *Riddell* (US).

P. perfoliatus exhibits such an amount of variation that one might suppose it to include many varieties, yet these variants grade so insensibly into each other that lines can scarcely be drawn. Here, however, one is justified in refusing to give the variants formal rank, for they are sometimes found coming from the same rhizome, or as branches of the same plant.

In America, two extremes appear to deserve varietal recognition. One of these, a plant sparingly found in the cooler parts of northeastern North America, cannot be distinguished from *P. perfoliatus* of Europe. It approaches var. *gracilis* C. & S., which, being based entirely on variable foliage-characters, scarcely merits recognition as a genetic entity. Our plant is considered to be var. *typicus.* The few specimens from North America are all sterile. The other variety in North America is a smaller plant, with slender stem and delicate leaves having few prominent nerves. It is abundant from Newfoundland to New York and fruits freely. This latter plant has been separated from *P. perfoliatus* as *P. bupleuroides.* In its typical development in the brackish ponds of eastern Massachusetts, this plant differs so strikingly in size from the robust typical variety that, were it

not for the transitional forms so common in Maine, Quebec, and New York, it might well be regarded as a separate species.

In view of the fact that typical *P. perfoliatus* of Europe may have branches with foliage matching that of the variety *bupleuroides*, and that in patches of the latter variety there may occasionally be found plants bearing robust leaves approaching those of the typical variety, it seems best to treat them both as variants of the same species. Any differences in the fruits of var. *bupleuroides* and var. *typicus* of Europe are too slight and inconsistent to be used for distinguishing the varieties.

The remarks of Fryer as to the variability of *P. perfoliatus* in Europe are of importance here:

> *Potamogeton perfoliatus* has so considerable an amount of variation both in the shape and colour of the leaves that at first sight it seems easily separable into distinct varieties, but the examination of a good series, even of dried specimens, shows that the most extreme forms pass into one another so gradually that they are probably nothing more than *states* produced by local and often temporary conditions. An isolated plant growing in a newly dug clay pit afforded unusually good opportinuties for observation during several years, and this plant changed so much in the shape, colour, and even texture of the leaves, that I am further induced to think that all our British forms are mere states, not true varieties. When first noticed this single plant was very small, apparently a seedling of the year, and the leaves were elongated, thin, and diaphanous, . . . After three or four years the whole plant grew coarser in texture and the leaves were more horny, . . . Ultimately the plant spread and occupied a considerable part of the little pit in which it grew, and became so like the ordinary state of the species that I ceased to observe it, thinking that it had afforded sufficient proof that the texture and shape of the leaves are too inconstant to afford satisfactory grounds for varietal distinction.[1]

Mrs. Arber took a typical shoot of *P. perfoliatus* in July and kept it floating in a rain-water tub. "By October 1 most of the large perfoliate leaves had decayed and those on the new shoots were so much narrower and less perfoliate as to make it difficult to believe that they belonged to the same species."[2]

The work of the Pearsalls[3] with this species is very illuminating. Their ecological observations and experiments with plants of lakes and on those grown in tanks, led them to the conclusion that light intensity played a very great part in the shape of the leaf. However, leaf-shape was also influenced by other factors;

[1] Alfred Fryer, Pot. Brit. Isles 41 (1900).
[2] Agnes Arber, Water Plants 58 (1920).
[3] W. H. Pearsall & W. H. Pearsall, Journ. Bot. 61: 2 (1923).

the nature of the soil probably being the primary one. Plants on calcareous soil tended to have broader leaves than those of acid waters. In America var. *bupleuroides* appears to vary according to the chemical nature of the water. Plants of brackish water invariably have small ovate leaves; those of neutral or acid waters tend to have their leaves larger and of a more elongate shape.

Hybrids

As nearly all *Potamogeton*-hybrids lack fruit and as flowers among the broad-leaved species are of slight, if any, value in distinguishing entities, it is necessary to base one's opinions as to the probable parents on the characters of the leaves and the anatomy of the stem. It is important that both parents be found in the general vicinity of the hybrid they are supposed to have produced, though there is some question if this needs to be so, for such a hybrid may reproduce vegetatively and persist for long periods of time, sometimes, perhaps, after a parent has ceased to exist in that vicinity. Although interspecific hybrids (except *P. gramineus* × *illinoensis*) seem not to form mature fruit, they often produce pollen, some of which appears to be viable. It is suspected that in this way they backcross with the parents, producing plants which strongly simulate a given species, but show evidences of influence from some other species. In some such cases one parent can be named with assurance, the other with less confidence. In many such cases it seems wisest to correlate the plant with the species to which it shows the strongest affinity, even though in some minor details it does not agree with the normal development of the species with which it is placed. Unless this be done, the number of hybrids might be so great as to make a treatment unwieldy. It may well be that hybrids backcrossing with the parents will eventually supplant one or both parents, which will then not be found in the immediate vicinity of the hybrid.

Hybrids should be considered, not as taxonomic units in themselves, but as blends of two (or more) distinct entities. Most hybrids cannot be described, except by saying "intermediate between the parents." No attempt is made, except where quite obvious, to determine what variety of a species is the parent, nor is attempt made to designate which is the female and which the

male parent. For many collections both parents could not be definitely determined. Most of these are, however, cited and in some cases discussed under the hybrid that is most probable, as determined from herbarium sheets. I hope that collectors who are acquainted with some of the cited localities will observe the plants in the field, for it is among the growing plants that hybrids can be more easily recognized and their parents determined.

P. ALPINUS × NODOSUS

P. alpinus × *nodosus* (× *P. subobtusus*) Hagstr., Crit. Res. Pot. 147 (1916). Not *P. alpinus* × *americanus* (× *P. rectifolius*) Bennett, Journ. Bot. **40:** 147 (1902); nor Graebn. in Engler, Pflanzenr. **4:** fam. 11: 132 (1907). Not *P. alpinus* × *americanus* (× *P. Faxoni*) Robinson & Fernald in Gray, Man. ed. 7: 73 (1908). Not *P. Faxoni* Morong, Mem. Torr. Club **3:** no. 2: 22 (1893); nor Taylor, N. Am. Fl. **17:** pt. 1: 20 (1909). Not × *P. Faxoni* Bennett, Journ. Bot. **46:** 248 (1908). Not *P. alpinus* var. *Faxoni* Stevens, Ill. Guide to Fl. Pl. 96 (1910).

This hybrid is extremely difficult to recognize for seldom are both parents obvious and the stem-anatomy of the two is so similar that it is of little help except to exclude from the parentage all species with dissimilar anatomy of the stem. Hagström cites but one specimen, which, then, is the type of × *P. subobtusus:* "'Nov. Ebor.', E. Tuckerman Jr (hb. Upps.)." Material in the Gray Herb. and New York Bot. Gard. Herb., which is probably isotypic, may well be this hybrid; both are mixed with typical *P. alpinus* var. *tenuifolius.* Other collections which may be this hybrid are: NEW YORK: in a canal or raceway at Niagara Falls, Aug. 21, 1886, *Morong* (G); Niagara R., Aug. 23, 1886, *Coville* (US); Normans Kill, Kenwood, *C. H. Peck 2* (US).

P. ALPINUS × GRAMINEUS

?P. alpinus × *gramineus* (× *P. nericius*) Hagstr., Crit. Res. Pot. 145 (1916).

No American specimens can be cited that are undoubtedly this hybrid. However, plants growing in Mattagodus Stream, Prentiss, Penobscot Co., MAINE, which I studied and collected (*Ogden & Wright* 2342) may possibly be this hybrid. It grew in close proximity to *P. alpinus* v. *tenuifolius* and *P. gramineus.* It is, however, more likely to be *P. gramineus* × *P. perfoliatus* var. *bupleuroides;* the latter species was not found in the im-

mediate vicinity, but is plentiful in the region. Other collections that might belong here are: Churchill, Manitoba, *Polunin 2070* (C, G, this might be *P. gramineus* × some linear-leaved species. *P. gramineus* is quite obviously a parent, but there are no interlacunar bundles in the stem, and the reddish color suggests *P. alpinus*); Okanogan R., Washington, *Sereno Watson 396* (G); Catfish L., Algonquin Park, Ontario, *Macoun 22220* (C). Collections from Quebec: Hull Brook, *Harrington 99100;* Brigham's Creek, Hull, *John Macoun 85531;* also *Malte 118259, 118260, 118261 & 118262*, may be this hybrid.

P. amplifolius × illinoensis

?P. amplifolius × *illinoensis* (× *P. scoliophyllus*) Hagstr., Crit. Res. Pot. 164 (1916); *?*× *P. scoliophyllus* forma *barensis* Hagstr., ibid.

Hagström cites a specimen from Bear Lake, Manistee, Michigan, collected by Morong in 1882 as the type for × *P. scoliophyllus*, and on the supposition that a form might someday be found differing from this, further named the Bear Lake plant: forma *barensis*. None of the collections of Morong from Bear Lake, Manistee, Mich. that I have seen appears to be this hybrid, though both *P. amplifolius* and *P. illinoensis* are represented. Hagström reports this hybrid also from Cedar Lake, Ont. and Buckingham, Que., but cites no specimens. I have seen no specimen that I would refer here.

P. amplifolius × praelongus

Collections that may be this are: Wisconsin: Green Bay, sloughs between Halfway Slough and Bass Channel, June 29, 1890, *J. H. Schuette* (F); Green Bay, between Duck Creek Channel and Bars Channel, nearer to the latter, July 17, 1890 (or 1899?), *J. H. Schuette* (F); Green Bay, June 23, 1891, *J. H. Schuette* (F). New York: very abundant, Southeast Bay, Saratoga L., Saratoga Co., *Muenscher & Lindsay 2814b* (G). Vermont: Tinmouth P., Tinmouth, Aug. 5, 1907, *G. G. Kennedy* (G).

P. amplifolius × Richardsonii

A collection from the north end of Tupper L., Franklin Co., New York, *Muenscher & Clausen 3784* (G), may be this hybrid.

P. epihydrus var. Nuttallii × pulcher

Virginia: outlet of Lee's Millpond, Isle of Wight Co., *Fernald & Long 12230* (G).

P. NATANS × NODOSUS

?× *P. perplexus* (*nodosus* × *natans*), Benn., Trans. & Proc. Bot. Soc. Edinburgh **29:** 53 (1924).

Bennett considers a collection from: BRITISH COLUMBIA: Sumas L., Chilliwack Valley, *J. M. Macoun 26815* to be this hybrid and makes it the type of × *P. perplexus*. It may be this, but from the three sheets in the National Museum of Canada (TYPE), the Gray Herbarium, and the New York Botanical Garden, it appears to me to be a typical *P. illinoensis*.

P. GRAMINEUS × NODOSUS

?× *P. argutulus* Hagstr., Bot. Not. 106 (1908); Hagstr., Crit. Res. Pot. 220 (1916). ?× *P. argutulus* formseries *nodosifolius* Hagstr., Bot. Not. 106 (1908); ? Hagstr., Crit. Res. Pot. 220 (1916).

The following may belong here: MAINE: Merrymeeting Bay, Topsham, Sagadahoc Co., *Steinmetz 527* (G, ME, O); Sunkhaze Stream, Milford, Penobscot Co., *Ogden & Steinmetz 1607* (O). NEW HAMPSHIRE: Connecticut R., Cornish, Sept. 2, 1886, *F. H. Knowlton* (US). NEW YORK: Spencer L., Spencer, Tioga Co., *Thomas 1494* (G); east shore of Hudson R., above Coveville, Washington Co., *Muenscher & Lindsey 2715* (O). DISTRICT OF COLUMBIA: in the vicinity of Washington, Aug. 5, 1879, *L. F. Ward* (US). WEST VIRGINIA: Greenbrier R., Talcott, Summers Co., *Morris 1343* (F, US, possibly *P. illinoensis* × *nodosus*).

P. ILLINOENSIS × NODOSUS

P. alpinus × *pensylvanicus* Benn., Journ. Bot. **28:** 301 (1890). *P. Faxoni* Morong, Mem. Torr. Club **3:** no. 2: 22 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11:75 (1907); Taylor, N. Am. Fl. **17:** pt. 1: 20 (1909). ? *P. lonchites* × *rufescens* Morong, Mem. Torr. Club **3:** no. 2: 22 (1893). ? *P. alpinus* × *Claytonii*, Graebn. in Engler, Pflanzenr. **4:** fam. 11: 75 & 132 (1907). × *P. Faxoni* = *P. americanus* × *pensylvanicus* Benn., Journ. Bot. **46:** 248 (1908). × *P. champlainii* = *P. alpinus* × *pensylvanicus* Benn., Journ. Bot. **46:** 248 (1908). × *P. Faxoni* = *P. alpinus* × *americanus* Robinson & Fernald, Gray Man. ed. 7: 73 (1908). *P. alpinus* var. *Faxoni* Stevens, Ill. Guide to Fl. Pl. 96 (1910). *P. illinoensis* × *nodosus* Hagstr., Crit. Res. Pot. 200 (1916). *P. lucens* × *nodosus* (× *P. subrufus*) Hagstr., Crit. Res. Pot. 241 (1916).

The following are referred here: QUEBEC: Ile Bizard, *Adrien 1442* (G, MT). VERMONT: Little Otter Creek, Ferrisburg, Aug. 10, 1880, *C. E. Faxon* (G, MSC, NE, NY, US, type of *P. Faxoni* in NY); Aug. 20, 1880, *C. E. Faxon* (G, NE); Little Otter Creek, near Barnum's Mill and Ferrisburg Station, Ferrisburg, Aug. 19,

1882, *Edwin Faxon* (G, NE, NY), Aug. 23, 1882, *Edwin Faxon* (F, G, NE, NY): Otter Creek, below Vergennes, Addison Co., Aug. 24, 1882, *Edwin Faxon* (NE); Otter Creek, Middlebury, Sept. 5, 1896, herb. *Ezra Brainerd* (G); Little Otter Creek, near Lake Champlain, Ferrisburg, Addison Co., *Ogden & Bolan 1589½* (G); Lewis Creek, Ferrisburg, Aug. 20, 1881, *E. & C. E. Faxon* (G, US), Aug. 18, 1882, *Edwin Faxon* (F, G, NY, isotypes of × *P. champlainii*). New York: Lake Champlain, Plattsburg, Aug. 19, 1885, *Morong* (C, G, NY); outlet of Lake Seneca, Geneva, Aug. 14, 1884, *Morong* (C, G, NY, cotype collection of × *P. subrufus*). Virginia: northeast part of Four-mile Run, Chesapeake Bay region, *Shull 471* (G, NY, US). Missouri: Cooley L., Clay Co., *Metcalf 1055* (US). Texas: Cebelo Creek, near Boerne, Kendall Co., *E. J. Palmer 12907* (G, NY, US, possibly not this hybrid). Idaho: Altmas L., *Evermann 490* (F, possibly not this hybrid).

P. nodosus × Richardsonii

× *P. rectifolius* (*americanus* × *alpinus*) Benn., Journ. Bot. **40:** 147 (1902); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 132 (1907); Robinson & Fernald, Gray Man. ed. 7: 73 (1908). *P. americanus* Taylor, N. Am. Fl. **17:** pt. 1: 19 (1909), in part. *P. nodosus* × *Richardsonii* Hagstr., Crit. Res. Pot. 148 (1916).

Illinois: Railroad ditch, Stoney Island, Chicago, Sept. 14, 1900, *E. J. Hill 171.1900* (NY, isotype material of × *P. rectifolius*), Aug. 30, 1901, *Hill 179.1901* (C, isotype material of × *P. rectifolius*), Sept. 6, 1902, *Hill 191.1902* (G), also *Agnes Chase 1477* (F) & *1994* (F). Oregon: Sauvie's Island, *Thomas Howell 1497* (US).

P. epihydrus × nodosus

? *P. americanus* × *pensylvanicus* Benn., Journ. Bot. **46:** 250 (1908); not Benn., Journ. Bot. **46:** 248 (1908). *P. nodosus* × *Nuttallii* (× *P. subsessilis*) Hagstr., Crit. Res. Pot. 190 (1916).

Bennett mentions ". . . specimens gathered in New York and eastern Massachusetts by the late Dr. Morong . . . " and Hagström cites what may be the same Massachusetts collection. From Hagström's description and an examination of the specimens, it is obvious he refers to Morong's collection from Winchester, Massachusetts, Sept. 1, 1880 (NY), Aug. 8, 1881 (C, NY), Aug. 29, 1881 (G, 2 sheets, one mixed with *P. nodosus*), which is quite probably this hybrid.

P. gramineus × natans

? *P. natans* × *gramineus* (× *P. sparganifolius*) Hagstr., Crit. Res. Pot. 197 & 217 (1916).

Hagström cites: Pine Plains, NEW YORK, *Hoysradt*. What may be the same collection appears to me to be *P. gramineus*.

P. GRAMINEUS × ILLINOENSIS

P. Proteus Zizii C. & S., Linnaea **2:** 201 (1827), in part. *P. gramineus* var. ? *spathulaeformis* Robbins in Gray, Man., ed. 5: 487 (1867); not sensu Fern., RHODORA **23:** 190 (1921), nor RHODORA **35:** 130 (1933). *P. heterophyllus* forma *maximus* Morong, Mem. Torr. Bot. Club **3:** no. 2: 25 (1893), in part. *P. spathulaeformis* Morong, Mem. Torr. Club **3:** no. 2: 26 (1893); Graebn. in Engler, Pflanzenr., **4:** fam. 11: 91 (1907), as *P. spathuliformis*. *P. spathaeformis* Tuckerm. in herb., Robbins in Gray's Man. ed. **5:** 487 (1867), as a synonym; Benn., Journ. Bot. **38:** 130 (1900). × *P. spathaeformis* Fern., RHODORA **8:** 224 (1906); Robinson & Fern. in Gray, Man., ed. **7:** 74 (1908). *P. varians* Fryer, Journ. Bot. **27:** 308 (1889), as to American specimens. ? *P. Zizii* var. *porrectifolius* Benn. ex Graebn. in Engler, Pflanzenr. **4:** fam. 11: 83 (1907). ? *P. Zizii* var. *gracilis* Benn. ex. Graebn. in Engler, Pflanzenr. **4:** fam. 11: 83 (1907). ? *P. gramineus* × *Zizii* (× *P. spathuliformis*) Graebn. in Engler, Pflanzenr. **4:** fam. 11: 136 (1907). *P. angustifolius* Taylor, N. Am. Fl. **17:** pt. 1: 18 (1909), in part. *Spirillus Zizii* Nieuwland, Am. Mid. Nat. **3:** 17 (1913), in part. *P. illinoensis* × *lucens* (× *P. pseudolucens*) Hagstr., Crit. Res. Pot. 199 (1916). *P. gramineus* × *illinoensis* (× *P. deminutus*) Hagstr., Crit. Res. Pot. 209 (1916). *P. gramineus* × *illinoensis* × *lucens* (× *P. pseudo-Zizii*) Hagstr., Crit. Res. Pot. 210 (1916). *P. gramineus* × *lucens* (× *P. Zizii*) Hagstr., Crit. Res. Pot. 210 (1916). × *P. Zizii* forma *pulcherrimus* Hagstr., Crit. Res. Pot. 214 (1916). *P. angustifolius* of Am. auth., in part; not Bercht. & Presl, Rostlin **2:** Alismac. 19 (1821). *P. Zizii* of Am. auth., in part; not M. &. K. in Röhling, Deutschl. Fl. **1:** 845 (1823); nor Koch ex Roth, Enum. Plant. Germ. **1:** 531 (1827).

Of the numerous collections, the following may be mentioned: VERMONT: Lake Champlain, Alburgh, Aug. 22, 1885, *Morong* (NY, isotype of × *P. Zizii* forma *pulcherrimus*); Windmill Point Reef, Alburg, Grand Isle Co., *Muenscher, Manning & Maguire 73* (F); Lake Bomoseen, Castleton, Oct. 1, 1898, *W. W. Eggleston* (US). MASSACHUSETTS: Medford, herb. Tuckerman (NY, type of *P. gramineus* var. *spathulaeformis*, G, isotype); Mystic P., Medford, Oct. 8 & Sept. 24, 1865, some sheets without date, *Robbins* (G, MSC, NY, cotype material of *P. gramineus* var. *spathulaeformis*); also July 10, 1879 (G), July 25, 1879 (G, NY), Aug. 5, 1879 (NY), Aug. 11, 1879 (F, NY), Sept. 1, 1879 (NY), Sept. 15, 1879 (F, NY), Aug. 5, 1881 (MSC, NY), July–September (C), all by *Morong*; also July 27, 1880, *E. & C. E. Faxon*

(G, US); Fresh P., Cambridge, Sept. 5, 1853, Sept. 27 and Oct. 24, 1865, herb. *Wm. Boott* (G); also Sept. 21, 1867, *Robbins* (NY); also Aug. 1876 (F), July 25, 1879 (F, NY), Aug. 2, 1879 (US), July 13, 1880 (MSC) and Sept. 14, 1886 (NY), *Morong;* also Sept. 17, 1880, *C. E. Faxon* (G); Pleasant P., Wenham, Sept. 13, 1880, *E. & C. E. Faxon* (C, F, G, NY, US); also Sept. 9, 1881, *Morong* (NY); also *E. C. & E. B. Ogden, 1762* (O). Connecticut: Lake Saltonstall, Sept. 22 & 23, 1880, *E. Faxon* (G, US). New York: Cossayuna L., Washington Co., *Muenscher & Lindsey 2786* (F, G); Perch L., Jefferson Co., *Muenscher & Maguire 1684* (G); Lake Champlain, s. of Fort Ticonderoga, Essex Co., *Muenscher, Manning & Maguire 75* (F); Junius, near Geneva, *Baxter 5399* (US); Phillips P., Junius, Seneca Co., *Eames & MacDaniels 3463* (G); Pine Plains, *L. H. Hoysradt* (G). Ontario: McKay's L., near Ottawa, *Malte 118258* (G, V); cove above Grass Creek Island, 7 miles below Kingston, Frontenac Co., *Pennell 16333* (NY). Michigan: Crystal Falls, Iron Co., *Metcalf 2253* (US) & *2256* (G, US); Pine L., Ingham Co., 1893, *C. F. Wheeler* (C, mixed with *P. illinoensis*); Cassidy L., near Chelsea, Washtenaw Co., *Hermann 9294* (NY). Indiana: Grassy Creek, near Tippecanoe L., *Scovell 37* (US); bed of inlet to Gage L., Steuben Co., June 17, 1903, *C. C. Deam* (NY); e. side of Lake James and w. side of Pokagon State Park, Steuben Co., *Deam 56537* (G); Fletcher L., near Fulton, Fulton Co., *Deam 56524* (G); Lake Maxinkuckee, *Evermann 544a* (US). Wisconsin: Green Bay near Suamico's shore, July 11, 1886, *J. H. Schuette* (G); n. side of Puckaway L., Green Lake Co., *Uhler & McLaughlin 375* (F, G) *& 1091* (US). Minnesota: Green L., Chisago Co., July 1892, *B. C. Taylor* (NY); Pelican L., Koochiching Co., *Metcalf 1532* (G, US); Deep L., Cass Co., *Metcalf 2373* (US); Snail L., Ramsey Co., *Oosting 28164* (NY). Iowa: Armstrongs Grove, Aug. 1881, *R. I. Cratty* (NY). Nebraska: West Chain L., *Thomson 73b* (US); Dewey L., *Tolstead 616* (G). Idaho: Priest L., *MacDougal 304* (C, NY); also *Piper 3761* (G, NY, US); Pend Oreille L., Bonner Co., *Muenscher 10208* (G, O) *& 10212* (O). Arizona: Montezuma Well, *Jackson 52* (US); also *Taylor 78* (US).

P. gramineus × Richardsonii

P. nitens sensu Benn., Journ. Bot. **39:** 200 (1901), in part; also Journ. Bot. **65:** 115 (1927), in part. *P. epihydrum* × *angustifolius* Benn., Journ. Bot. **42:** 71 (1904). *P. Claytonii* × *Zizii* Graebn. in Engler, Pflanzenr. **4:** fam. 11: 133 (1907). × *P. subdentatus* β *petiolatus* Hagstr., Crit. Res. Pot. 201 (1916). *P. Hagströmii* Benn., Trans. & Proc. Bot. Soc. Edinburgh **29:** 51 (1924).

The following appear to be this hybrid: Ontario: Lake Nipissing, *Chitty 265* (G). Michigan: St. Mary's R., Sault Ste. Marie,

E. J. Hill 133.1881 (C); northwest end of Brevort L., Moran, Mackinac Co., *Ogden & Bolan 1681* (G, O); Detroit R., Oct. 4, 1892, *Farwell 473a* (G); also Aug. 25, 1892, *Farwell* (G); also Oct. 4, 1892, *Farwell* (NY). ILLINOIS: Wolf L., Chicago, *Agnes Chase 1713* (F); also June 10, 1911, *Earl E. Sherff* (F). ALBERTA: Indian Graveyard, Peace R., Wood Buffalo Park, *Raup 1547* (C, G, NY). COLORADO: Carleton L., near Grand L., *Shear & Bessey 5333* (NY). BRITISH COLUMBIA: Griffin L., *Macoun 4179* (C, G, isotypes of × *P. subdentatus* β *petiolatus*); Sumas L., *J. M. Macoun 26816* (C, type of *P. Hagströmii*, G, NY, isotypes).

P. GRAMINEUS × PERFOLIATUS var. BUPLEUROIDES

? *P. nitens* sensu Morong, Mem. Torr. Club **3:** no. 2: 34 (1893). *P. gramineus* var. *spathulaeformis* sensu Fern., RHODORA **23:** 190 (1921) and RHODORA **35:** 131 (1933); not Robbins in Gray, Man. 5: 487 (1867). × *P. nitens* var. *subgramineus* f. *restrictus* Hagstr., Crit. Res. Pot. 223 (1916). × *P. subnitens* Hagstr., Crit. Res. Pot. 259 (1916).

The following are referred here: NEWFOUNDLAND: Highlands Brook above bridge, Crabbes, *Kennedy 78* (G); Otter P., Brig Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss 27341* (F, G, probably backcrossed with *P. gramineus*); also *27342* (G, probably backcrossed with *P. gramineus*). QUEBEC: Matane R., Matane, Matane Co., Aug. 5, 1904, *Forbes 156* (C, G, one sheet of this collection in G is rather typical *P. perfoliatus* var. *bupleuroides*); Rivière Ouest, Gaspé Co., *Victorin, Rolland & Jacques 44459* (G, MT); Ile du Large, Iles de Boucherville, St. Lawrence R., *Victorin & Rolland 44738* (F, G); Berthier-en-bas, St. Lawrence R., *Rousseau 20444* (G); also *20445* (G, US, V); Ile Plate, St. Lawrence R., Longueuil, Chambly Co., *Victorin 8176* (G); also *28604* (C, G); also *Rolland 43361* (C, F, G); Ile Verte, St. Lawrence R., Longueuil, Chambly Co., *Rolland 43367* (G); also *43368* (F); also *43376* (G); also *43378* (G); also *43382* (F, G); Lac Aylmer, Wolfe Co., *Louis-Marie, Laporte & Dudemaine 301* (G). ANTICOSTI: Becscie R., *Macoun 2983* (C); Salt L., *Macoun 2986* (C). NEW BRUNSWICK: St. John R., Ingleside, Westfield, *Fernald 1609* (G); Hammond R., Hammond, Kings Co., *Svenson & Fassett 3025* (G); Jacquet R., Restigouche Co., *Svenson & Fassett 3030* (G); St. John R., Lincoln, Sunbury Co., *Fassett 2151* (G); Fredericton, July 30, 1892, *J. Fowler* (US); Campbellton, Aug. 26, 1905, *J. Fowler* (US). NOVA SCOTIA: "plaster hole lake" near Dingwall, Cape Breton Island, *Nichols 1037* (G); Shinimikas R., Northport, Cumberland Co., *Fassett 2150* (G); Midway (Centreville) L., Centreville, Digby Co., *Graves & Linder 19691* (G, perhaps backcrossed with *P. gramineus*). MAINE: St. John R., Madawaska, Aroostook Co., July 28, 1893, *Fernald* (G, NE, NY); Pushaw P., Oldtown, Aug. 21,

1899, *L. H. Harvey* (US); Pushaw P., Glenburn, Penobscot Co., *Ogden & Steinmetz 1544½* (G, O); Pushaw P., Hudson, Penobscot Co., *Ogden & Steinmetz 2195* (ME, O); Mattagodus Stream, Prentiss, Penobscot Co., *Steinmetz 320* (G, ME, O, possibly *P. alpinus* × *gramineus*); also *Ogden & Wright 2342* (ME, O, possibly *P. alpinus* × *gramineus*). New Hampshire: Connecticut R., Walpole, *Fernald 440* (G); mouth of brook, Melvin, *Sargent 31* (G). Vermont: Winooski R., Essex Junction, *Blake 2216* (US); Connecticut R., Brattleboro, 1865, *C. C. Frost* (G). Massachusetts: Wenham P., Sept. 13, 1880, *Edwin Faxon* (C, G, NY, US, see next citation); also Sept. 5, 1882, *Edwin Faxon* (G, NY, type collection of × *P. subnitens;* some of the Wenham Pond collections appear to be this hybrid, probably backcrossed with *P. perfoliatus* var. *bupleuroides;* some cannot be distinguished from ecological forms of *P. perfoliatus* var. *bupleuroides*). Connecticut: Taunton P., Newtown, *E. H. Eames 11733* (G); Beardsley P., Danbury, *E. H. Eames 11741* (G, possibly not this hybrid). New York: Hudson R., Mechanicville, Rensselaer Co., *Muenscher & Lindsey 2770* (G) & *2865* (G, O); Myers Pt., Cayuga L., Aug. 13, 1884, herb. *W. R. Dudley* (NY); Old Chenango Canal, near South Oxford, July 1, 1886, *F. V. Coville* (US); Chemung R. near Wellsburg, *Lucy 10843* (F); Chenango R., Brisben, June 28, 1887, *F. V. Coville* (US); slow stream, ½ mi. s. of the Jefferson Co. line, on route No. 3, n. w. of Sandy Creek, Oswego Co., *Ogden & Bolan 1578* (G, O). New Jersey: river-edge above Phillipsburg, July 23, 1886, *T. C. Porter* (NY). Pennsylvania: near Easton, Sept. 8, 1868, *T. C. Porter* (F). Virginia: Dyke, Fairfax Co., *Metcalf & Sperry 1684* (US). Ontario: Almonte, July 6 & 7, 1898, *J. Fowler* (F, G); Missinaibi R., *J. M. Macoun 2979* (C, G).

This cross is between species of relatively unrelated subsections and the progeny are extremely variable and often very odd. As with most hybrids among the broad-leaved species of *Potamogeton*, no description can be given that is both inclusive and limiting. The hybrid must be distinguished as an intermediate between the two parents. It often appears with floating leaf-blades tapering gradually into the petiole and with clasping submersed leaves having sharp-pointed apices. Mature fruit is unknown in interspecific crosses, but may occasionally appear in backcrosses. The anatomy of the stem shows a blend between the two parents, presenting all the possible combinations with a triotype or oblong-type of stele, O-cells or U-cells in the endodermis, and cortical bundles present or absent. Next to *P. gramineus* × *illinoensis*, this is probably the most frequent *Potamogeton-*

hybrid in North America. It is one of the easiest to recognize. The nearest approach to it is *P. gramineus* × *Richardsonii* which can usually be distinguished by its coarser stipules.

P. GRAMINEUS × P. SP.

P. angustifolius var. *methyensis* Benn., Journ. Bot. **29:** 151 (1891). *P. Zizii* var. *methyensis* Benn. in Macoun, Cat. Can. Pl. 370 (1890); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 83 (1907). *P. methyensis* Benn., Trans. & Proc. Bot. Soc. Edinburgh **29:** 50 (1924).

Methye L., near Methye Portage, SASKATCHEWAN, July 18, 1888, *J. M. Macoun 4178* (C, TYPE of *P. methyensis*).

A number of collections are hybrids with *P. gramineus* quite evidently one of the parents. Among these is the Methye Lake plant upon which *P. methyensis* is based. From the single sheet seen by me I cannot determine the other parent. *P. illinoensis* might seem a good guess, but it is not reported so far north. *P. alpinus* and *P. Richardsonii* abound in the region, but I am unable to see marked influence of either of these species. Hagström may not have seen this collection; at least he mentions the name only in the index to his Critical Researches. He is, however, referring to it (among others) when he says, ". . . but many *Zizii*-like North American plants are not at all this hybrid, but of another origin, and great carefulness is necessary when considering these difficult forms."[1]

P. ILLINOENSIS × RICHARDSONII

INDIANA: Bass L., Starke Co., Aug. 7, *W. S. Blatchley* (Deam).

P. ILLINOENSIS × PERFOLIATUS var. BUPLEUROIDES

? × *P. subdentatus* α *sessilis* Hagstr., Crit. Res. Pot. 201 (1916); not × *P. subdentatus* β *petiolatus* Hagstr., ibid.

NEW YORK: Sodus Bay, *Killip 12264* (G, US); Onondaga L., Aug. 1, 1890, *L. M. Underwood* (NY). FLORIDA: Apalachicola, herb. *Chapman* (G, NY, US); mouth of Choctawhachee R., June 18, 1880, *C. Mohr* (US). ALABAMA: estuary of Mobile R., July 22, 1884, *C. Mohr* (US).

Hagström cites a specimen from Queenston, ONTARIO (without mentioning collector's name and date), which he considers to be *P. illinoensis* × *perfoliatus*. I have not seen this collection.

[1] Hagström, Crit. Res. Pot. 216 (1916).

The collection from Griffin L., British Columbia, which he also cites as having these parents, is *P. gramineus* × *Richardsonii*.

P. illinoensis × P. sp.

". . . a peculiar form of P. natans," Morong, Bull. Torr. Bot. Club **13:** 145 (1886). *P. floridanus* Small, Fl. Se. U. S. 37 and 1326 (1903); Benn., Journ. Bot. **45:** 376 (1907); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 62 (1907). ? *P. Tepperi* Benn., Journ. Bot. **45:** 373 (1907); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 62 (1907). ". . . apparently an immature form. . ." of *P. natans*, Taylor, N. Am. Fl. **17:** pt. 1: 16 (1909). "probably belonging to the group *Amplifolii*," Hagstr., Crit. Res. Pot. 268 (1916).

Florida: Blackwater R., May 1886, *A. H. Curtiss* (NY, type and isotype of *P. floridanus*); also June 22, 1886, *Curtiss* (NY).

Further collections and perhaps a study of the living plants will be needed to determine the exact nature of this plant. It is possible that it is a cross between *P. illinoensis* and a linear-leaved species. The stem-anatomy is: stele with the proto-type pattern, endodermis of U-cells, interlacunar bundles weakly developed and only in the outer interlacunar circle, subepidermal bundles absent or weakly developed, pseudo-hypodermis present or absent. Curtiss collected in the same river, and by the dates on the sheets presumably at the same time, fragmentary bits of *P. foliosus* Raf. var. *macellus* Fern. Other linear-leaved species of *Potamogeton*, subgenus *Eupotamogeton*, found in the general region are: *P. pusillus* L. (*P. panormitanus* Biv.), *P. Berchtoldi* Fieber (*P. pusillus* of auth., not L.), *P. diversifolius* Raf., and *P. capillaceus* Poir. None of these linear-leaved species has interlacunar bundles and all have O-cells in the endodermis, so if one is a parent, the other parent must possess interlacunar bundles and a U-celled endodermis. The only broad-leaved species agreeing with this would be *P. illinoensis*. The stelar pattern of the plant in question leads me to consider *P. pulcher* as a possible parent, though it lacks interlacunar bundles and has an O-celled endodermis. In such case, the only linear-leaved species that can be considered to be the other parent is *P. pectinatus*, in the subgenus *Coleogeton;* it being the only linear-leaved species in the region with interlacunar bundles and with U-cells in the endodermis. It is possible that the plant is a pronounced eco-

logical form of *P. Oakesianus* or *P. natans*, neither of which has been otherwise found within 600 miles of Florida.

P. praelongus × Richardsonii

Michigan: Saulte Ste. Marie, Aug. 4, 1881, *E. J. Hill* (US). Utah: Fish L., Sevier Co., *Tanner 5786* (F).

P. perfoliatus var. bupleuroides × Richardsonii

It is reasonable to suppose that the two closely related species, *P. Richardsonii* and *P. perfoliatus*, would hybridize rather freely where their ranges overlap. Such appears to be the case, for these species remain quite recognizable (though exhibiting much ecological variation) throughout their separate ranges, but where these ranges overlap, all intergradations occur. One might consider the entities that bridge the narrow gap to be those from which the two species have evolved were it not that such plants are always sterile and often exhibit other evidences of hybridism. Such plants occur in Quebec, northern Maine, New Hampshire, and are especially abundant in New York. They occasionally occur elsewhere. Although the evidence is strongly in favor of numerous hybrids between *P. Richardsonii* and *P. perfoliatus* var. *bupleuroides*, it is practically impossible to be sure of this with individual collections, for ecological or other conditions of growth might cause a simulation of this in either of these closely related species. For this reason, no collections are cited.

P. Berchtoldi × perfoliatus var. bupleuroides

Rhizome extensively creeping. Stem terete .4–.7 mm. in diameter, usually branched; stele with the oblong-type pattern (sometimes with the 1-bundled-type pattern), endodermis of non-stratified O-cells; interlacunar and subepidermal bundles absent, or with a few weakly developed subepidermal ones; pseudo-hypodermis 1 cell thick. Leaves all submersed, delicate, oblong to oblong-linear, .5–4 cm. long, .2–.6 cm. wide; nerves 3–7; sessile and cuneate at base, semi-clasping; apex obtuse or acutish, but not sharp-pointed; margin entire (with 1-celled denticles on the Nantucket specimen); lacunae of 1 or 2 rows of cells each side of the midrib, commonly with a pair of glands at the base. Stipules delicate, more or less persistent, ovate-oblong, rounded at apex, .3–1.5 cm. long, without keels. Peduncles about same thickness as stem, sometimes slightly incrassate, 1–4 cm. long. Spikes with 1–4 whorls, not crowded at anthesis; in flower .2–.5

cm. long, .2–.3 cm. thick. Flowers sessile; sepaloid connectives greenish, blades orbicular or elliptical, 1–1.8 mm. wide, claws .6–.8 mm. long; anthers .7–1 mm. long. Mature Fruits unknown. Immature fruits obovate, about .9 mm. long (excluding beak) and .8 mm. wide; beak prominent, about .5 mm. long, curved toward the back; keels none; exocarp greenish; seed aborted, apex pointing toward basal end. Winter Buds abundantly produced late in the season, mostly near the rhizome, with leaves appressed to the shortened axis, or tightly appressed for about half their length and with the upper halves strongly divergent; basal glands prominent and forming adventitious roots.

P. mysticus Morong, Bot. Gaz. **5:** 50 (1880); Mem. Torr. Club **3:** no. 2: 34 (1893); Graebn. in Engler, Pflanzenr. **4:** fam. 11: 95 (1907); Robinson & Fern. in Gray, Man. ed. 7: 75 (1908), with suggestion that it is "probably a hybrid" of *P. bupleuroides* (*perfoliatus* var. *bupleuroides*) and *P. pusillus* (*Berchtoldi*); Taylor, N. Am. Fl. **17:** pt. 1: 22 (1909), "apparently a depauperate form" of *P. perfoliatus*, and "may be a hybrid"; Britton in Britt. & Brown, Ill. Fl. **1:** 80 (1913) "apparently a depauperate form" of *P. perfoliatus* and "Perhaps a hybrid." *P. bupleuroides* × *pusillus* (× *P. mysticus*) Hagstr., Crit. Res. Pot. 259 (1916).

In brackish water, Maine, Massachusetts, and Maryland. The following are referred here: Maine: Dunston Marshes, Scarboro, Sept. 20, 1920, *A. H. Norton;* Stuart Brook, West Scarboro, Scarboro, Cumberland Co., *Steinmetz & Marston 539, Plantae Exsiccatae Grayanae 905;* also *Steinmetz* 617; also *Ogden, Rollins & Wiggins 1731;* Lily P., Fortune Rocks, Biddeford, Sept. 3, 1899, *G. G. Kennedy.* Massachusetts: Mystic P., Aug. 13 and Sept. 3, 1865, *Wm. Boott;* Mystic P., Medford, on several dates in 1879, 1880, and 1881 by *Morong* and the *Faxons;* Miacomet P., Nantucket, July 13, 1887, *Morong.* Maryland: near Ocean City, *H. L. Clark 6.*

This interesting hybrid was evidently first collected by Wm. Boott in Mystic Pond (now called Mystic Lakes) in 1865. In 1879 Morong found the plant still there, and in 1893 wrote, "Since I obtained this . . . in 1879, I have visited the locality for several years in succession, and, though I have always found the plant growing vigorously, yet it has shown no signs of prefecting [sic] fruit."[1] In the summers of 1935, '36 and '37 I searched the Mystic Lakes carefully for it without success. The town of Medford extends only into the lower lake where *P. perfoliatus* var. *bupleuroides* now abounds. In this lower lake no

[1] Morong, Mem. Torr. Club. 3: no. 2: 35 (1893).

P. Berchtoldi was seen, but there is in the middle lake, now separated from the lower by a dam, a flourishing patch of *P. Berchtoldi* var. *tenuissimus*. This var. of *P. Berchtoldi* was found with the hybrid at Scarboro, Maine, and it appears safe to designate this variety as one of the parents of the Mystic Lakes and Scarboro plants. Whether it is this variety of *P. Berchtoldi* which is a parent of the other specimens cannot be said. A search at the Scarboro locality, where the plant thrives in abundance, failed to reveal any mature fruits, although flowering spikes were plentiful. One of the most striking characteristics of this plant in the latter part of the season is its abundance of winter buds. In its morphological characters as well as its stem-anatomy this hybrid is intermediate between the supposed parents.

Explanation of Plates

Plate 746. Fruits of potamogeton (all × 5)

P. alpinus var. tenuifolius: fig. 1, Maine, *Fernald* 117; fig. 2, Newfoundland, *Kennedy* 81; fig. 3. Washington, *Suksdorf* 2172.

P. alpinus var. subellipticus: fig. 4, Maine, Sept. 5, 1894, *Fernald;* fig. 5, Quebec. *Fernald, Long & St. John* 6766 (type); fig. 6, New York, *House* 15182.

P. polygonifolius: figs. 7, 8, 9, Newfoundland, *Fernald & Wiegand* 4467.

P. amplifolius: fig. 10, Ohio, *Goodrich* 209; figs. 11 & 12, New York, *Muenscher & Maguire* 723 (12 with mesocarp removed); fig. 13, Ontario, Aug. 19, 1902, *Fowler.*

P. pulcher: fig. 14, Rhode Island, *Fernald, Long & Torrey* 8444; fig. 15, Massachusetts, July 1887, *Morong;* figs. 16, 17, Massachusetts, June 16, 1878, *C. E. Faxon* (17 with mesocarp removed).

P. nodosus: fig. 18, Minnesota, *Hotchkiss & Jones* 480; fig. 19, Connecticut, 1845. *Robbins;* fig. 20, Wisconsin, July 28, 1891; fig. 21, District of Columbia, Sept. 25, 1897, *Steele.*

P. natans: fig. 22, Ontario, *Ogden & Bolan* 1646; fig. 23, Minnesota, *Grant & Oosting* 3203; figs. 24, 25, New York, *Ogder & Bolan* 1580 (25 with mesocarp removed).

P. Oakesianus: fig. 26, Massachusetts, Aug. 28, 1851, *Robbins;* fig. 27, Quebec, *Fernald, Long & St. John* 6765; fig. 28, Nova Scotia, *Long & Linder* 19679; fig. 29, Michigan, *Pease & Ogden* 25135.

P. illinoensis: fig. 30, Iowa, July 21, 1882, *Cratty;* fig. 31, Illinois, Sept. 1881, *Patterson* (type); figs. 32, 33, Florida, *Curtiss* 6692; fig. 34, Indiana, *Lansing* 1079; fig. 35, New York, *R. Hitchcock* 11175a.

P. gramineus: fig. 36, Washington, *J. W. Thompson* 7589; fig. 37, Newfoundland, *Fernald & Long* 1210; fig. 38, Michigan, *Metcalf* 2187.

P. praelongus: figs. 39, 40, New York, *Muenscher & Maguire* 1747.

P. Richardsonii: fig. 41, Wisconsin, *Cheney* 4919; fig. 42, New York, Aug. 21, 1886, *Mororg;* fig. 43, Quebec, *Victorin* 18462; fig. 44, Michigan. 1863, *Robbins;* fig. 45, Washington, Aug. 1892, *Piper;* fig. 46, Montana, *Maguire* 497.

P. perfoliatus var. bupleuroides: fig. 47, Newfoundland, *Robinson & Schrenk* 207 (type); fig. 48, Maryland, *Coville* 118; fig. 49, Nova Scotia, *Graves & Linder* 19693; fig. 50, Quebec, *Fernald, Long & St. John* 6771 (mesocarp removed).

PLATE 747. POTAMOGETON NATANS: CROSS-SECTION OF STEM, × 35.

Camera-lucida drawing (cell-contents not shown) by *Francis T. Horne* from preparation by *Edith B. Ogden.*

PLATE 748. CAMERA-LUCIDA DRAWINGS (CELL-CONTENTS NOT SHOWN) FROM STEMS OF POTAMOGETON SHOWING TYPES OF STELES.

FIG. 1, P. AMPLIFOLIUS, × 40 (*Ogden & Marston* 1693); FIG. 2, P. PERFOLIATUS var. BUPLEUROIDES, × 75 (*Steinmetz* 526); FIG. 3, P. NODOSUS, × 75 (*Metcalf* 1105); FIG. 4, P. GRAMINEUS var. MAXIMUS, × 75 (*Ogden & Steinmetz* 1552); FIG. 5, P. GRAMINEUS var. TYPICUS, × 75 (*Ogden & Bolan* 1644); FIG. 6, P. BERCHTOLDI var. TENUISSIMUS × PERFOLIATUS var. BUPLEUROIDES (× *P. mysticus*), × 100 (*Ogden, Rollins & Wiggins* 1731).

LIST OF NUMBERED EXSICCATAE

Abrams, L. R. 6094, 8677 natans, 9241 amplifolius.

Adams, J. W. 293 amplifolius, 511 Oakesianus.

Adams & Tash. 512 crispus.

Adams & Trudell. 378 amplifolius.

Adrien, F. 1316 perfoliatus v. bupleuroides, 1442 illinoensis × nodosus, 1470, 1750 perfoliatus v. bupleuroides, 1758 Richardsonii, 1806 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii), 1809 nodosus, 1975 perfoliatus v. bupleuroides.

Alexander, C. P. 90 nodosus.

Allen, J. A. 55 pulcher, 149, 180, 181 gramineus.

Anderson, J. P. 20 gramineus approaching v. maximus, 21 natans, 838 Richardsonii, 1344 natans, 1522 Richardsonii.

Anderson, R. M. 118276 Richardsonii.

Anderson & Fassett. 19349 amplifolius.

Anderson, Smith & Weatherby 1166 natans.

Anselm, Bro. M. 18 natans, 20 gramineus v., 298 perfoliatus v. bupleuroides, 366, 376 praelongus.

Applegate, E. I. 741 gramineus approaching v. maximus, 742 natans, 3416 Richardsonii, 4489 natans.

Arsène, L. 38 pulcher, 40 perfoliatus v. bupleuroides, 41 polygonifolius, 43 perfoliatus v. bupleuroides.

Arsène & Benedict. 15429, 16636 nodosus.

Arthur, Bailey & Holway B46, B69, B403 gramineus v. maximus.

Austin, Mrs. R. M. 575, 1177 Richardsonii, 1672 natans.

Bailey, L. H. 86 natans.

Bailey, W. W. 1135 Richardsonii.

Baker, C. F. 427 illinoensis.

Ballard, C. A. 731½ gramineus approaching v. maximus.

Barkley, F. A. 1783 gramineus, 1996 gramineus v. myriophyllus, 1997 Richardsonii.

Baxter, M. S. 5382 praelongus, 5385 Richardsonii, 5388 crispus, 5389 nodosus, 5391 illinoensis, 5392 gramineus, 5395 natans, 5396 illinoensis, 5399 gramineus × illinoensis, 5402 illinoensis, 5403 amplifolius.

Bean & White. 19675 natans, 19696 perfoliatus v. bupleuroides, 22962 gramineus v. maximus, 22963 alpinus v. tenuifolius.

Bebb, R. 994 illinoensis, 995 natans, 1007 illinoensis (perhaps gramineus × illinoensis), 1008 natans, 1009 praelongus, 1538 illinoensis.

Beetle, A. A. 1462 Richardsonii, 2341 gramineus.

Bell, R. 2968 amplifolius.

Benson, L. 2824 natans, 4013 gramineus.

Bergman, H. F. 443 gramineus, 2484 amplifolius.

Berkley, E. E. 1215 crispus, 1387 amplifolius.

Bessey, E. A. B & D2781 alpinus v. tenuifolius.

Bicknell, E. P. 91 gramineus, 92 illinoensis, 112 Oakesianus, 118 perfoliatus v. bupleuroides, 122 praelongus.

Biltmore Herbarium. 688 Richardsonii, 4413a illinoensis, 5806a

nodosus, 5980a pulcher, 8806b nodosus.

Bissell, C. H. 633 natans.

Bissell & Linder. 19678 natans, 19692 gramineus, 19695 perfoliatus v. bupleuroides.

Blake, S. F. 2212 perfoliatus v. bupleuroides, 2216 gramineus × perfoliatus v. bupleuroides, 2308 Richardsonii, 3071 gramineus, 5483 perfoliatus v. bupleuroides, 9472 crispus.

Blakley, O. W. 1453 pulcher.

Blewitt, A. E. 632 amplifolius, 1677 perfoliatus v. bupleuroides, 1977 gramineus, 1978 perfoliatus v. bupleuroides, 2137 Richardsonii, 3651 perfoliatus v. bupleuroides, 3652 gramineus, 3657 nodosus, 4319, 4320 perfoliatus v. bupleuroides.

Bodin, J. E. 264 illinoensis.

Boettcher, F. L. J. 9 pulcher.

Boivin & Blain. 294 alpinus v. tenuifolius, 670 perfoliatus v. bupleuroides, 1344 alpinus v. tenuifolius approaching v. subellipticus, 2139 alpinus v. tenuifolius, 2446 alpinus v. subellipticus.

Bolander 274 illinoensis.

Bowman, P. W. 303 gramineus, 392 Oakesianus.

Breed, Jeffrey, Jenkins, Loveless, Phillips, Stauffer & Stebbins 20 Richardsonii.

Brewer, W. H. 1783 gramineus, 1978 alpinus v. tenuifolius.

Bridges, T. 359 natans.

Brien, C. 306 nodosus.

Brinkman, A. H. 734 Richardsonii, 2277, 2289, gramineus, 4541 alpinus v. tenuifolius.

Brittain. 2987 gramineus v. maximus.

Brown, H. E. 644 natans.

Brown, S. 694 Richardsonii.

Burgess. 3029 natans.

Burkholder & Muenscher. 16404 amplifolius, 16424, 16425 Richardsonii.

Burkholder & Tressler. 16888 Richardsonii.

Burnham, S. H. 42 illinoensis.

Bush, B. F. 89 pulcher, 112 amplifolius, 1207 nodosus, 1318 amplifolius, 6947 illinoensis.

Butler, B. T. 251 gramineus, 255 Richardsonii, 257, 296 gramineus.

Butler, G. D. 142 Richardsonii.

Cain, R. F. 935 nodosus, 938 gramineus, 940 Richardsonii, 941 amplifolius, 972 praelongus, 978 illinoensis, 1030, 1031 amplifolius, 1043 gramineus v. maximus (perhaps gramineus × sp.), 1045 natans, 1049 Richardsonii, 1050 praelongus, 1051, 1052 Richardsonii.

Camp, S. H. 13 praelongus.

Carter, W. R. 337 gramineus v., 505 gramineus.

Chamberlain, E. B. 412 amplifolius, 616 perfoliatus v. bupleuroides, 617 natans, 913 perfoliatus v. bupleuroides, 943 natans, 1033 perfoliatus v. bupleuroides.

Chamberlain, G. D. 1750, 1770 gramineus, 2011 alpinus v. tenuifolius, 2123 perfoliatus v. bupleuroides, 2159 gramineus, 2240 praelongus, 2276 praelongus.

Chamberlain & Collins. 616 perfoliatus v. bupleuroides.

Chamberlain & Knowlton. 571 perfoliatus v. bupleuroides.

Chamberlain & Morris. 11741 Oakesianus.

Chase, Agnes. 1420 nodosus, 1421 Richardsonii, 1459 natans, 1466 praelongus, 1477 nodosus × Richardsonii, 1707 gramineus, 1710 amplifolius, 1713 gramineus × Richardsonii, 1994 nodosus × Richardsonii.

Cheney, L. S. 499 praelongus, 683 gramineus v. maximus, 866 Richardsonii, 1086 nodosus, 1420 natans, 1501 alpinus v. tenuifolius, 1735 amplifolius, 2097, 3576 Richardsonii, 3610 Oakesianus, 4919 Richardsonii, 4921 illinoensis.

Chitty, D. H. 204 gramineus, 260 natans, 261 gramineus, 265 gramineus × Richardsonii, 268, 269 gramineus (perhaps gramineus × perfoliatus v. bupleuroides), 306 Richardsonii, 319 amplifolius, 328 gramineus.

Clark, D. 2008 Richardsonii.

Clark, H. L. 6 Berchtoldi × perfoliatus v. bupleuroides.

Clark, H. W. 5 amplifolius, 6 illinoensis, 10 amplifolius.

Clements, F. 305, 2627 nodosus, 2979 amplifolius.

Clements, F. E. & E. S. 491 alpinus v. tenuifolius.

Cléonique. 7231 amplifolius.

Clinton, G. W. 5 gramineus v. maximus.
Clokey, I. W. 3118 alpinus v. tenuifolius.
Collins, F. S. 300 Oakesianus, 421 perfoliatus v. bupleuroides, 937 natans.
Collins, Fernald & Pease. 4013½, 5200, 5200A, 5287 gramineus, 5295 natans, 5314 gramineus, 5510 gramineus v., 5578 perfoliatus v. bupleuroides, 5911 alpinus v. subellipticus, 6050 alpinus v. subellipticus, 6125 gramineus.
Conard, H. S. 182 natans, 318 Richardsonii.
Cooper, W. S. 69 gramineus, 93 amplifolius, 94 gramineus v., 215 amplifolius, "254 in pt." alpinus v. tenuifolius, 260 natans, 312 praelongus.
Cooper & Andrews. 14 gramineus.
Copeland, E. B. 406 gramineus approaching v. maximus.
Copeland. 3482 gramineus approaching v. myriophyllus.
Corbett & Williams. 11 Richardsonii.
Cory, V. L. 8502 illinoensis, 9198 nodosus, 20906, 23819 illinoensis, 24332 nodosus, 24335, 27999 illinoensis, 29711 nodosus.
Cotton, J. S. 809 Richardsonii.
Coville, F. V. 114, 118 perfoliatus v. bupleuroides, 129, 189 amplifolius, 602 gramineus, 1254 praelongus.
Coville & Applegate. 44 gramineus approaching v. myriophyllus.
Coville & Funston. 1244, 1278 nodosus, 1693 gramineus.
Coville & Kearney. 385 gramineus, 1564 alpinus v. tenuifolius.
Coville & Leiberg. 224, 228 natans.
Cowles, H. C. 1405 natans.
Crandall, C. S. 2530 nodosus.
Crickmay, C. H. 5 Richardsonii.
Curtiss, A. H. 4, 6692 illinoensis.
Cushman, J. A. 1766 natans, 6007 nodosus, 6009 Richardsonii, 6010 gramineus, 6825 gramineus v. maximus.
Cusick, W. C. 2484 praelongus, 2597 natans, 3620 Richardsonii.
Daniels, F. 683 nodosus.
Darlington, H. T. 1311 illinoensis, 1323, B & D2401, B & D2692 Richardsonii.
Davis, R. J. 378-W praelongus.
Dawson, G. M. 3046 Richardsonii.
Deam, C. C. 25704 pulcher, 31302 gramineus × illinoensis, 31591 gramineus, 38978 nodosus, 48466 amplifolius, 49019 natans, 49042 illinoensis, 49205 gramineus × illinoensis, 49248 illinoensis, 49268 natans, 49274, 49285, 49312 illinoensis, 49314 amplifolius, 49315 gramineus × illinoensis, 49347, 49355 illinoensis, 49360 natans, 49363, 49369, 49372, 49389 illinoensis, 49391 natans, 49394 praelongus, 49395 illinoensis, 49399 amplifolius, 49402, 49417 illinoensis, 52273 amplifolius, 52334 natans, 52341 illinoensis, 52385 nodosus, 52425 amplifolius, 52437 natans, 54236, 54462 illinoensis, 55176 nodosus, 55313 amplifolius, 55350, 55410 illinoensis, 56274A Richardsonii, 56396 illinoensis, 56398 praelongus, 56401, 56441, 56448 illinoensis, 56490 amplifolius, 56498, 56501 illinoensis, 56502 amplifolius, 56524 gramineus × illinoensis, 56534 amplifolius, 56537 gramineus × illinoensis, 56538, 56539 illinoensis, 56541 natans, 56545 illinoensis, 56546 natans, 56547, 56568 illinoensis, 56607 crispus, 56616 amplifolius, 56680, 56682 illinoensis, 56683 amplifolius, 56686 Richardsonii, 56687 illinoensis, 56692, 56704, 56783 nodosus, 57139 praelongus, 57149 natans, 57195 illinoensis, 57259 gramineus.
Dean & Thomas. 3465 Richardsonii.
Delamare, M. 341 perfoliatus approaching v. bupleuroides.
Demaree, D. 7051, 7132, 17893 nodosus.
De Selm, A. W. 22 gramineus v. myriophyllus, 24 amplifolius and natans.
Dobbin, F. 860 Richardsonii, 863 perfoliatus v. bupleuroides, 1072 Richardsonii, 1112 illinoensis, 1186 amplifolius, 1207 nodosus, 1209 illinoensis, 1327 Richardsonii, 1328, 1330 natans.
Dodge, C. K. 4 Richardsonii, 7 illinoensis, 8 gramineus, 115 natans, 122 Richardsonii, 131 gramineus, 133 illinoensis and Richardsonii, 146 Richardsonii, 147 gramineus,

153 gramineus v. maximus and gramineus approaching v. maximus, 154 perhaps gramineus × illinoensis, 155 gramineus v. maximus, 156 natans, 171 illinoensis, 172 amplifolius, 384 gramineus, 1037, 1038 Richardsonii.

Doutt, M. T. 2145, 2258 Richardsonii, 2490 praelongus, 3296 alpinus v. tenuifolius, 3323 Richardsonii.

Dowell & Painter 5385 nodosus.

Driggs, A. W. 40 nodosus.

Drouet, F. 3028 nodosus.

Drouet & Richards. 3309 gramineus.

Drummond, T. 250 nodosus, 272 illinoensis.

Drushel, J. H. 6069 perfoliatus v. bupleuroides.

Dubois, A. 660 perfoliatus v. bupleuroides.

Dudley, W. R. 18, 19 natans, 20 illinoensis, 2030 natans, 2201 alpinus v. tenuifolius, 2202 natans.

Eames, A. J. 1498 gramineus, 1500 gramineus × perfoliatus v. bupleuroides, 3460 nodosus, 3467 crispus, 9099 gramineus.

Eames, E. H. 8707 illinoensis, 8746 pulcher, 9590 praelongus × sp., 11351 illinoensis, 11485, 11502 crispus, 11733 gramineus × perfoliatus v. bupleuroides, 11741 perhaps gramineus × perfoliatus v. bupleuroides, 11742 illinoensis, 11745 gramineus v. maximus, 11749, 11750 illinoensis, 11856 crispus.

Eames & Gershoy. 9101 Richardsonii.

Eames & Godfrey. 8685 praelongus, 9334 alpinus v. subellipticus.

Eames & MacDaniels. 3463 gramineus × illinoensis.

Eames, Randolph & Wiegand. 11175 illinoensis, 11181 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii).

Eames & Thomas. 3459 nodosus.

Eames & Wiegand. 9100 Richardsonii, 9102 perfoliatus v. bupleuroides, 11162 natans, 11172 amplifolius, 11173 gramineus, 11179 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii), 14535 crispus.

Eaton, A. A. 335 illinoensis.

Edwards & Clausen. 1400 perfoliatus v. bupleuroides.

Eggleston, W. W. 1 nodosus, 1655 amplifolius, 1656 alpinus v. subellipticus, 2111 Oakesianus, 9974 Richardsonii.

Ehlers, J. H. 533, 1756, 7957 praelongus.

Elmer, A. D. E. 2798 amplifolius.

Emig, W. H. 224 nodosus.

Empain, Rousseau & Noreau. 50925 Richardsonii.

Evans, W. H. 780 gramineus v. maximus, 781 natans.

Evermann, B. W. 490 perhaps illinoensis × nodosus, 492 Richardsonii, 493 amplifolius, 544a perhaps gramineus × illinoensis, 1032 natans, 1057 Richardsonii, 1079 illinoensis, 1221 gramineus, 1222 illinoensis, 1223 amplifolius.

Eyerdam, W. J. 1122 praleongus, 1143 gramineus, 1316 gramineus × sp., 2141 alpinus v. tenuifolius, 2156 Richardsonii, 2360 alpinus v. tenuifolius.

Farwell, O. A. 473 gramineus, 473a gramineus × Richardsonii, 505 natans, 514 alpinus v. subellipticus, 900 illinoensis.

Fassett, N. C. 8 gramineus v., 85, 456 perfoliatus v. bupleuroides, 468 amplifolius, 2148 perfoliatus v. bupleuroides, 2150, 2151 gramineus × perfoliatus v. bupleuroides, 2152 perfoliatus v. bupleuroides (this number also a linear-leaved species according to Fernald, Mem. Am. Acad. Arts & Sci. 17: pt. 1: 62 & 127), 3148, 4350 nodosus, 5343 alpinus v. tenuifolius, 5362 amplifolius, 7535 Richardsonii, 9014 praelongus, 9061 Richardsonii, 9067, 9069 gramineus, 14262 gramineus, v. myriophyllus, 14746 crispus, 18731 illinoensis, 18803 Oakesianus.

Fassett & Wilson. 4349 nodosus.

Fellows, D. W. 2006 amplifolius, 2007 Richardsonii, 2966, 4679 perfoliatus v. bupleuroides, 4887 Richardsonii, 5656 gramineus × sp.

Fendler, A. 132 amplifolius, 837, 839 nodosus.

Fernald, M. L. 116 gramineus approaching v. maximus, 117 alpinus v. tenuifolius, 436 gramineus v. maximus, 440 gramineus × perfoliatus v. bupleuroides, 475 natans, 477 gramineus v. maximus,

509 Oakesianus, 750 pulcher, 778 natans, 1609 gramineus × perfoliatus v. bupleuroides, 1610, 1611, 1612 perfoliatus v. bupleuroides, 1614 amplifolius, 1619 gramineus, 1622 alpinus v. tenuifolius, 2756 natans, 2767 gramineus v. maximus, 8439, 15965 Oakesianus.

Fernald & Abbe. 2506 amplifolius.

Fernald, Bartram & Long. 23129 natans, 23131 Oakesianus, 23141 gramineus v. maximus.

Fernald, Bartram, Long & Fassett. 23139 amplifolius.

Fernald, Bartram, Long & St. John. 6764 Oakesianus, 6769 perfoliatus v. bupleuroides.

Fernald, Bissell, Graves, Long & Linder. 19689 amplifolius.

Fernald & Collins. 327 alpinus v. subellipticus, 965 alpinus v. tenuifolius.

Fernald, Dodge & Smith. 25421 perfoliatus, 25422, 25423, 25424 praelongus.

Fernald & Fogg. 505, 747 Oakesianus.

Fernald, Gilbert & Hotchkiss. 27346 praelongus.

Fernald & Griscom. 4295 pulcher.

Fernald, Griscom & Long. 4535 pulcher.

Fernald, Hunnewell & Long. 8443 pulcher, 8445 perfoliatus v. bupleuroides.

Fernald & Jackson. 11986 natans, 11987 alpinus v. tenuifolius, 11988 gramineus, 11989 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii).

Fernald & Linder. 19682 Oakesianus.

Fernald & Long. 1210 gramineus, 5977 pulcher, 7747 crispus, 8440, 8441 Oakesianus, 8442, 8538 pulcher, 9799 crispus, 10089 pulcher, 10873 perfoliatus v. bupleuroides, 12229 pulcher, 12230 epihydrus v. Nuttallii × pulcher, 12381 natans, 12386 alpinus v. tenuifolius, 12387 alpinus v. subellipticus, 12388 alpinus v. tenuifolius, 12389 nodosus, 12391, 12392 perfoliatus v. bupleuroides, 13216 pulcher, 15967 perfoliatus v. bupleuroides, 17805 Oakesianus, 17807 perfoliatus v. bupleuroides, 19677 natans, 19687 alpinus v. subellipticus, 19688 amplifolius, 19690 gramineus, 19694 perfoliatus v. bupleuroides, 23130 natans, 23132 Oakesianus, 23137, 23138 pulcher, 23140 amplifolius, 23142 gramineus approaching v. maximus, 23143 perfoliatus v. bupleuroides, 27344 gramineus v., 27345 gramineus, 27347 praelongus.

Fernald, Long & Dunbar. 26217 Oakesianus, 26218 polygonifolius, 26221 alpinus v. subellipticus, 26222 perhaps gramineus × perfoliatus v. bupleuroides, 26223 praelongus.

Fernald, Long & Fogg. 1207 alpinus v. tenuifolius, 1208 Oakesianus, 1209 gramineus v. maximus, 1211 praelongus, 1212 perfoliatus v. bupleuroides.

Fernald, Long & Norton. 12382 natans, 12383, 12384 Oakesianus.

Fernald, Long & St. John. 6763 natans, 6765 Oakesianus, 6766 alpinus v. subellipticus, 6767, 6768 praelongus, 6770, 6771 perfoliatus v. bupleuroides.

Fernald, Long & Torrey. 8444 pulcher.

Fernald & Pease. 3066 Oakesianus, 16957, 17056 gramineus, 19676 natans.

Fernald & St. John. 10894 natans.

Fernald & Smith. 25420 alpinus v. subellipticus.

Fernald & Strong. 477 gramineus v. maximus.

Fernald & Svenson. 744 gramineus v. myriophyllus, 745 natans, 748 Oakesianus, 749 praelongus, 751 perfoliatus v. bupleuroides.

Fernald & White. 19680 Oakesianus.

Fernald & Wiegand. 2435 natans, 2436 Oakesianus, 2443 alpinus v. tenuifolius approaching v. subellipticus, 2444 praelongus, 2448 gramineus, 2449 gramineus v. maximus, 2450 perfoliatus, 4466 Oakesianus, 4467, 4468 polygonifolius, 4473 alpinus v. tenuifolius, 4478, 4479 gramineus, 4483, 4484, 4485 perfoliatus v. bupleuroides, 14533 illinoensis.

Fernald, Wiegand & Bartram. 4463 Oakesianus.

Fernald, Wiegand, Bartram & Darlington. 4477 gramineus v. maximus.

Fernald, Wiegand & Darlington.

4461, 4462 natans, 4464, 4465 Oakesianus, 4474 alpinus v. tenuifolius, 4475 gramineus v. maximus, 4476 gramineus, 4480 gramineus v. maximus, 4481 gramineus, 4482 praelongus.

Fernald, Wiegand & Eames. 14082 alpinus v. tenuifolius, 14084, 14085 gramineus, 14086 amplifolius, 14087 Richardsonii, 14088 Richardsonii and perfoliatus v. bupleuroides, 14089 crispus.

Fernald, Wiegand & Kittredge 2437 Oakesianus, 2441 praelongus, 2442 alpinus v. subellipticus, 2445, 2446, 2447 gramineus, 2451 perfoliatus v. bupleuroides.

Fernald, Wiegand & Long. 27348 perfoliatus.

Fernald, Wiegand, Long, Gilbert & Hotchkiss. 27341, 27342 gramineus × perfoliatus v. bupleuroides (probably backcrossed with gramineus)

Ferris, Roxana S. 2043 natans, 8845 amplifolius.

Fiker, C. B. 1455 natans.

Fink, B. 191 illinoensis.

Fitch, A. 7778 natans.

Fletcher. 2969 amplifolius, 3025, 3028 natans, 3044 Richardsonii.

Fogg, J. M. 710, 1840, 2077, 2997, 3505 pulcher, 3606 perfoliatus v. bupleuroides, 3867 Oakesianus, 4504 pulcher, 4934 amplifolius, 4935 praelongus, 6794 nodosus, 12254 crispus.

Forbes, F. F. 156 perfoliatus v. bupleuroides and gramineus × perfoliatus v. bupleuroides.

Foster, A. S. 866 natans, 1992 amplifolius.

Fredholm, A. 6183 illinoensis.

Fulton, H. J. 9703 nodosus.

Garrett, A. O. 529 alpinus v. tenuifolius approaching v. subellipticus, 3958 nodosus.

Gates, F. C. 258 Richardsonii, 261 praelongus, 1752.2 natans, 10540 praelongus, 10644 illinoensis, 12217 natans.

Gauthier, R. 100 amplifolius, 135 perfoliatus v. bupleuroides, 2422 amplifolius.

Gillman, H. 40 Richardsonii (perhaps Richardsonii × sp.), 65 Richardsonii, 67 illinoensis.

Glatfelter, Herbarium of N. M. 561 amplifolius, 562 Richardsonii.

Gleason, H. A. & H. A. Jr. 166 natans, 302, 310 gramineus.

Gleason & Shobe. 176 amplifolius, 179 natans.

Glendenning, R. 92616, 92617 gramineus, 92618 Richardsonii.

Goldman, E. A. 2453 natans.

Goodale, Markert & Piper. 76938, 76945, 76947 natans, 76948, 76951 Oakesianus, 76973 gramineus, 96988 pulcher.

Goodding, L. N. 539 nodosus.

Goodman, B. B. 16287 nodosus.

Goodman & Hitchcock. 1803 illinoensis (perhaps gramineus × illinoensis).

Goodrich, Sara F. 207 Richardsonii, 209 amplifolius.

Gorman, M. W. 233, 677 Richardsonii, 703 illinoensis, 781 Richardsonii.

Graham, E. H. 9821 nodosus.

Grant, M. L. 3029 praelongus.

Grant & Oosting. 3184 illinoensis, 3203 natans, 3206 Richardsonii, 3207 illinoensis, 3272 gramineus, 3275 amplifolius, 3276 gramineus.

Graves & Linder. 19681 Oakesianus, 19691 gramineus × perfoliatus v. bupleuroides (perhaps backcrossed with gramineus), 19693 perfoliatus v. bupleuroides.

Griffin, D. B. 1 illinoensis.

Griffiths, D. 6 Richardsonii.

Griffiths & Schlosser. 4 amplifolius.

Grimes, E. J. 594 nodosus, 3255 crispus, 4196 pulcher.

Griscom & Mackenzie. 10679 amplifolius, 10680 perfoliatus v. bupleuroides, 10681 praelongus, 10685 natans, 10686 gramineus.

Hall, E. 486 natans, 487 (this number also a linear-leaved species according to Fernald, Mem. Am. Acad. Arts & Sci. 17: pt. 1: 115 & 129), 488, 488a amplifolius, 489, 490 Richardsonii.

Hall & Chandler. 563 alpinus v. tenuifolius.

Hamilton. 64010 alpinus v. tenuifolius.

Hanes, C. R. 327 nodosus, 367, 377, 397, 477 gramineus × sp., 487, 497 illinoensis, 507 gramineus × sp., 517 illinoensis, 757 amplifolius, 1928 Oakesianus and epihydrus v. Nuttallii, 1978, 1988 natans.

Harper, F. 74 gramineus v. maxi-

mus (perhaps gramineus × alpinus), 98, 141 Richardsonii.

Harper, R. M. 24 illinoensis (not typical), 1402, 2088 pulcher.

Harrington, W. H. 2441 perfoliatus v. bupleuroides, 99085 gramineus, 99086 gramineus v. maximus, 99088 perfoliatus v. bupleuroides, 99089, 99090 Richardsonii, 99091 perfoliatus v. bupleuroides, 99092 natans, 99099 perhaps gramineus × illinoensis, 99100 perhaps alpinus × gramineus, 99101 nodosus, 99102 gramineus v. maximus.

Harris, S. K. 539 praelongus, 540 perfoliatus v. bupleuroides.

Harrison, A. K. 15 natans, 16 illinoensis.

Hartweg, T. 2016 nodosus (this number also a linear-leaved species according to Fernald, Mem. Am. Acad. Arts & Sci. 17: pt. 1: 66 & 130), 2017 nodosus.

Hawkins, P. H. 650 Richardsonii.

Hay, G. U. 2989 gramineus, 4131 praelongus.

Hayden, Ada. 751 Richardsonii, 752 nodosus, 804 Richardsonii, 806 nodosus, 807 illinoensis, 811 Richardsonii, 821 gramineus, 823 natans, 10112 nodosus, 10113 Richardsonii, 10114, 10115, 10116, 10117, 10123, 10129 nodosus.

Haydon, W. 254 natans.

Heller, A. A. 939 natans, 5824 nodosus.

Henderson, L. F. 1007 natans, 1009 Richardsonii, 2473 illinoensis, 2474 amplifolius, 2475 illinoensis, 2477 gramineus v., 2717 natans, 4882 nodosus.

Hermann, F. J. 5781 gramineus, 6281 praelongus, 7153, 7224 Richardsonii, 7230 gramineus, 8234 praelongus, 8286 gramineus, 8647 crispus, 9294 gramineus × illinoensis, 9383, 9728 nodosus.

Herriot, W. 78019, 78020 gramineus.

Hill, A. F. 1222, 1513 Oakesianus, 2341 perfoliatus v. bupleuroides, 2560 Oakesianus, 2560a natans.

Hill, E. J. 46.1884 pulcher, 92.1888 alpinus v. subellipticus, 133.1881 gramineus × Richardsonii, 151.1901, 159.1909 nodosus, 162.1900 illinoensis, 171.1900, 179.1901, 191.1902 nodosus × Richardsonii.

Hitchcock, A. E. 260 gramineus, 444, 1034 nodosus.

Hitchcock, A. S. 1000, 1099 amplifolius, 12358 natans, 15655 nodosus.

Hitchcock, R. 11167, 11168 nodosus, 11175a illinoensis.

Hodgdon, A. R. 11 perfoliatus v. bupleuroides, 530 nodosus, 2640 natans, 2647 perfoliatus v. bupleuroides, 2652 amplifolius.

Hodgdon & Healey. 2977 natans.

Hodgdon, Jones, Nolan & Harrington. 3378 amplifolius.

Holway, E. W. D. 40 Richardsonii.

Hotchkiss, N. 75 alpinus v. tenuifolius approaching v. subellipticus, 2646 amplifolius, 2731 gramineus (perhaps gramineus × illinoensis), 27338 alpinus v. subellipticus.

Hotchkiss & Jones. 417 gramineus, 480 nodosus, 3928 praelongus, 3976, 4003 Richardsonii, 4033 illinoensis, 4058 Richardsonii, 4059 gramineus, 4060 praelongus, 4083 gramineus, 4109 nodosus, 4110 natans, 4112 gramineus, 4133 illinoensis.

Hotchkiss & Koehler. 4179 illinoensis, 4192 amplifolius, 4193 natans, 4194 gramineus, 4222, 4223, 4226, 4227 illinoensis, 4228 praelongus, 4245 illinoensis, 4246 praelongus, 4262, 4304 illinoensis, 4307 gramineus, 4326, 4331 illinoensis, 4340 praelongus, 4349 alpinus v. subellipticus, 4353 amplifolius.

Hotchkiss & Martin. 4432 illinoensis, 4460 alpinus v. subellipticus.

House, H. D. 517 nodosus, 1329 amplifolius, 1338, 5044 natans, 6053 amplifolius, 7244 natans, 8220 Richardsonii, 8838 amplifolius, 10069 crispus, 10070 praelongus, 15182 alpinus v. subellipticus, 15193 gramineus, 16979 natans, 19852, 20002 nodosus, 21752 amplifolius, 21774, 22044 nodosus, 23174 gramineus.

Howe & Lang. 768 natans, 1040 gramineus.

Howell, J. T. 7679 Richardsonii.

Howell, T. J. 364 Richardsonii, 365 natans, 1496 Richardsonii, 1497 nodosus × Richardsonii, 1498 amplifolius, 1668 gramineus.

Hultén, E. 7573 alpinus v. tenuifolius.

Hylan, D. R. 79 natans.
Innes & Moon. 1093 nodosus.
Jackson, H. H. T. 52 gramineus × illinoensis.
Jepson, W. L. 147 alpinus v. tenuifolius, 238 Richardsonii.
Jesup, H. G. 4 gramineus approaching v. myriophyllus.
Johnson, H. N. 2719 nodosus, 2725 perfoliatus v. bupleuroides.
Johnston, I. M. 6001 illinoensis.
Jones, G. N. 3511 illinoensis, 3889 alpinus v. tenuifolius, 5227, 7851 gramineus.
Jones, M. E. 734, 1297 alpinus v. tenuifolius, 1304 gramineus v. maximus, 2310 nodosus, 5788 Richardsonii, 6023 praelongus, 6606 alpinus v. tenuifolius, 9293, 9295 gramineus, 9299 Richardsonii.
Jones, R. N. 7465 illinoensis, 7470, 7471 crispus.
Jones, W. W. 432 nodosus.
Jones & Hoffman. 7467 Richardsonii.
Jones & Wiegand. 7462 illinoensis.
Kearney, T. H. 74 nodosus, 1626 pulcher.
Keck, D. D. 1188 natans.
Keck & Stevens. 280 illinoensis, 323 Richardsonii, 332 amplifolius, 335 crispus.
Keck & Stilwill. 368 natans, 373 gramineus, 377 amplifolius, 379 gramineus, 401 nodosus, 402 natans, 412 praelongus, 428, 430 crispus, 433 amplifolius, 454 gramineus, 455 praelongus, 458 Richardsonii.
Kellogg & Harford. 949 illinoensis.
Kelsey & Jordan. 8 gramineus, 9 perfoliatus.
Kendall, Goldsborough & Doolittle. 12 amplifolius, 17 praelongus, 22 gramineus, 111 perfoliatus v. bupleuroides (perhaps perfoliatus v. bupleuroides × Richardsonii).
Kennedy, Rachel B. 78 gramineus × perfoliatus v. bupleuroides, 80 natans, 81 alpinus v. tenuifolius, 82, 405 gramineus, 478 perfoliatus v. bupleuroides, 543 Oakesianus, 551 perfoliatus v. bupleuroides.
Kenoyer, L. A. 136 illinoensis (perhaps gramineus × illinoensis), 139 praelongus.
Killip, E. P. 931 amplifolius, 6203 Richardsonii, 6204 natans, 6896 pulcher, 12258 natans, 12261 amplifolius, 12264 illinoensis × perfoliatus v. bupleuroides, 12265 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii), 12266 gramineus (perhaps gramineus × illinoensis), 12487 natans and amplifolius, 12535 nodosus, 12574 Oakesianus and epihydrus v. Nuttallii, 12605 alpinus v. subellipticus and amplifolius, 12610 amplifolius, 13379 Oakesianus, 30845 pulcher.
Kimball, R. H. 70 Oakesianus.
Kindle, E. M. 93540, 93572 gramineus, 93584 natans.
Knowlton, F. H. 288 natans.
Knowlton & Weatherby. 6632 Oakesianus.
Kreager, F. O. 441 amplifolius.
Krotkov, P. V. 5142 alpinus v. tenuifolius approaching v. subellipticus and epihydrus v. Nuttallii, 5144 gramineus, 5145 gramineus v., 5147 natans, 5150 praelongus, 7027 illinoensis, 7033, 7034, 7035, 7036 gramineus, 7038 natans, 7041 Richardsonii, 8629 amplifolius, 8633 natans.
Kubichek, W. F. 7 natans, 13 gramineus, 17, 64 Richardsonii, 66 gramineus, 71, 72 illinoensis, 78 gramineus, 79 natans, 101 gramineus, 109 Richardsonii, 110, 114, 115 illinoensis, 115b amplifolius and natans, 120 amplifolius, 121, 123 illinoensis, 132 gramineus v., 142 gramineus, 147, 148, 149 nodosus, 172 gramineus, 173, 184 illinoensis, 190 natans, 192 gramineus, 196 illinoensis.
Kuntze, Herbarium of Otto. 3105 perhaps gramineus × illinoensis.
Laing, H. M. 147 Richardsonii.
Lake, E. R. 614 gramineus.
Lakela, Olga. 2731 gramineus.
Lambert, Bertha B. 1 amplifolius.
Lansing, O. E. 1059 nodosus, 1079, 1779 illinoensis, 4274 natans.
Lawton, Amy C. 50 nodosus, 53 Richardsonii.
Leiberg, J. B. 751 gramineus, 1574 Richardsonii.
Leonard & Killip. 603 nodosus, 863 perfoliatus v. bupleuroides.
Leonard & Mannakee. 5489 amplifolius.
Lewis, H. F. 130388 natans, 130390, 130391, 130393 alpinus v.

tenuifolius, 130394, 130395, 130396 gramineus, 130397 perfoliatus.

Lindheimer, F. 116, 311, 393 nodosus, 513, 547 illinoensis, 1234 nodosus.

Linsdale & Keck. 1 gramineus, 54 amplifolius, 59 illinoensis, 115 amplifolius, 127 natans, 153 praelongus.

Long, C. A. E. 937 natans, 1012 gramineus.

Long & Linder. 19679 Oakesianus.

Looff, Ethel H. & H. B. 1501 alpinus v. tenuifolius.

Lorenzo. 35771 natans.

Louis-Marie, R. 313 alpinus v. tenuifolius, 1255 nodosus.

Louis-Marie, Laporte & Dudemaine. 301 gramineus × perfoliatus v. bupleuroides, 302 gramineus, 501 Richardsonii, 1403 gramineus, 1525 perfoliatus.

Lucien. 20458 amplifolius.

Lucy, T. F. 424 nodosus, 10814 crispus, 10816 nodosus, 10841, 10842 perfoliatus v. bupleuroides (perhaps perfoliatus v. bupleuroides × Richardsonii), 10843 gramineus × perfoliatus v. bupleuroides.

Lunell, J. 150 gramineus.

Mabbott, D. C. 251, 252, 317, 334, 350, 390 Richardsonii, 459 natans, 500 Richardsonii.

McAtee, W. L. 977 nodosus, 1060 perfoliatus v. bupleuroides, 1707 illinoensis, 2279, 2337 amplifolius, 2374 nodosus, 2953 crispus, 3074, 3076 gramineus, 3078 natans, 3082 illinoensis, 3201a, 3205 Oakesianus, 3409 illinoensis, 3420 gramineus.

McCabe, T. T. 43 alpinus v. tenuifolius, 47 natans.

McCalla, W. C. 2370 Richardsonii.

MacDaniels, L. H. 3464 illinoensis.

MacDougal, D. T. 44 Richardsonii, 80 gramineus approaching v. maximus, 240 natans, 241 gramineus, 302 Richardsonii, 303 amplifolius, 304 gramineus × illinoensis, 462 natans, 543 nodosus, 571 alpinus v. tenuifolius, 638 gramineus approaching v. maximus, 639 gramineus, 676 natans, 805, 956 Richardsonii.

McKay. 4129 praelongus.

Mackenzie, K. K. 293 illinoensis, 359 pulcher, 2305 amplifolius, 3613 gramineus v. maximus, 4377 natans.

Mackenzie & Griscom. 10043 natans, 10044 Oakesianus, 10045 amplifolius, 10047 alpinus v. subellipticus, 10048 gramineus, 10048a gramineus approaching v. maximus, 10049 perfoliatus v. bupleuroides.

McLouth, C. D. 4 illinoensis.

MacMillan & Sheldon. 488 gramineus, 571 Richardsonii, 1332 gramineus v. maximus.

McMurphy, J. 192 nodosus, 193 natans.

Macoun, J. M. 2975 gramineus, 2979 gramineus × perfoliatus v. bupleuroides, 2980, 2984, 2992 gramineus, 3020, 3021, 3022, 3026 natans, 3045 Richardsonii, 3047 Richardsonii (perhaps Richardsonii × sp.), 3049, 3052, 3054, 3055, 3056 Richardsonii, 4162, 4165 alpinus v. tenuifolius, 4166 alpinus v. subellipticus, 4178 gramineus × sp., 4358 natans, 4362 gramineus v. maximus, 4368, 4381 Richardsonii, 26814 natans, 26815 illinoensis (perhaps a hybrid), 26816 gramineus × Richardsonii, 26817 Richardsonii, 80929, 83118 gramineus, 86002 amplifolius.

Macoun, John. 8 natans, 9 praelongus, 14 illinoensis (this number also a linear-leaved species according to Fernald, Mem. Am. Acad. Arts & Sci. 17: pt. 1: 55 & 131), 94 alpinus v. tenuifolius, 95 Richardsonii, 96 gramineus, 97 gramineus v. maximus, 98 gramineus approaching v. maximus, 1730 amplifolius, 1733 gramineus approaching v. maximus, 1740 Richardsonii and perfoliatus v. bupleuroides, 2967 amplifolius, 2970 nodosus, 2971 natans and epihydrus v. Nuttallii, 2972, 2974, 2977 gramineus, 2978 gramineus v. maximus, 2981, 2982, 2982a gramineus, 2983, 2986 gramineus × perfoliatus v. bupleuroides, 2991 gramineus, 2993 Oakesianus, 2995, 2996 illinoensis, 3019 natans, 3023 illinoensis, 3024, 3027 natans, 3043 perfoliatus v. bupleuroides, 3048 Richardsonii, 3053, 3057 Richardsonii, 4128, 4130, 4132, 4132a praelongus, 4163, 4165, 4167, 4167a alpinus v. tenuifolius, 4168, 4169 alpinus v. subellipticus, 4177 illinoensis, 4179 gramineus × Richardsonii, 4180 illinoensis, 4357 natans, 4360 gramineus

v. maximus × nodosus, 4364 amplifolius, 4365 alpinus v. tenuifolius, 4379, 4380, 4382 Richardsonii, 8006 alpinus v. tenuifolius, 16441 gramineus, 16458, 16459, 16460, 16461 Richardsonii, 20748, 20749 Oakesianus, 20751 alpinus v. subellipticus approaching v. tenuifolius, 20756 perfoliatus v. bupleuroides, 22176 Richardsonii, 22177 nodosus, 22211, 22212 natans, 22216, 22217 gramineus, 22220 perhaps alpinus × gramineus, 22221 amplifolius, 22227 perfoliatus v. bupleuroides, 22228, 22229 amplifolius, 23173, 23175 Richardsonii, 23180 gramineus, 26824, 26826 Richardsonii, 26830 crispus, 26832, 26833 Richardsonii, 26834 amplifolius, 26839 nodosus, 26840 natans, 26841, 62015, 62016 nodosus, 62021 illinoensis, 62022 natans, 62023, 62024 gramineus, 68425 natans, 68919, 78320, 78321 alpinus v. tenuifolius, 85530 natans, 85531 perhaps alpinus × gramineus, 85534 amplifolius, 85535, 85536 gramineus v. maximus, 85537 Richardsonii, 85550 nodosus, 88248, 88249, 88250, 88251 natans, 88252 amplifolius, 88253 gramineus v. maximus, 88254, 88255 gramineus, 88256 gramineus approaching v. maximus, 88257, 88258, 88259 praelongus.

Macoun & Herriot. 76868 gramineus, 76869 gramineus v. maximus, 76870, 76871, 76872 Richardsonii.

Maguire, B. 472 alpinus v. tenuifolius, 473 alpinus v. subellipticus, 474 alpinus v. tenuifolius, 483, 484 gramineus, 485, 486 praelongus, 488, 490, 491, 495, 496, 497 Richardsonii, 13149 gramineus v. maximus, 16201 Richardsonii, 16220 gramineus v. maximus, 1636 Richardsonii.

Maguire & Piranian. 5439 natans, 5440 Richardsonii, 5442 alpinus v. tenuifolius.

Maguire, Piranian & Richards. 12771 gramineus v. maximus.

Maguire & Richards. 13156 alpinus v. tenuifolius.

Maguire, Richards, Maguire & Hammond. 4367 illinoensis.

Malte, M. O. 118247, 118248, 118249 perfoliatus v. bupleuroides, 118250, 118251, 118252 Richardsonii, 118257 gramineus, 118258 perhaps gramineus × illinoensis, 118259, 118260, 118261, 118262 perhaps alpinus × gramineus, 118263, 118264 gramineus v. maximus, 118265 gramineus, 118266 gramineus v. maximus, 118267, 118268 amplifolius, 118269, 118270 natans, 118273, 118274, 118275 nodosus.

Malte & Watson. 960, 1276, 1818 Richardsonii.

Markert, W. C. 76909 perfoliatus v. bupleuroides.

Martin, A. C. 158 natans.

Martindale, I. C. 12003 amplifolius.

Mathias, Mildred E. 265 natans.

Maxon, William R. 4617 Richardsonii.

Mearns, E. A. 805 nodosus.

Merrill & Wilcox. 863 Richardsonii, 902 gramineus.

Mertie, J. B. 66 Richardsonii.

Metcalf, F. P. 8 illinoensis, 9 Richardsonii, 14 praelongus, 50 natans, 193, 304, 322, 339 Richardsonii, 345, 355 gramineus, 404 Richardsonii, 423 gramineus, 432, 451 Richardsonii, 471 gramineus, 512 Richardsonii, 522 praelongus, 542 Richardsonii, 544 natans, 546 praelongus, 547 Richardsonii, 636, 819, 842, 845 nodosus, 888, 929 amplifolius, 948 crispus, 1018, 1024 nodosus, 1055 illinoensis × nodosus, 1071, 1105 nodosus, 1139 natans, 1140 amplifolius, 1145 Richardsonii, 1147 praelongus, 1160 amplifolius, 1162 gramineus, 1176 Richardsonii, 1229 praelongus, 1291 pulcher, 1295 natans, 1297, 1298, 1329, 1370 illinoensis, 1373 gramineus, 1379, 1383 illinoensis, 1388 natans, 1390 Richardsonii, 1391 illinoensis, 1412 gramineus, 1413 praelongus, 1415 gramineus v., 1420, 1427 illinoensis, 1428 gramineus, 1432 illinoensis, 1463 Richardsonii, 1464 gramineus, 1470 illinoensis, 1471 nodosus, 1472 gramineus, 1511 amplifolius, 1520 gramineus, 1532 gramineus × illinoensis, 1542, 1543, 1551, 1563, 1564 illinoensis, 1780, 1794, 1839, 1908, 1937 Richardsonii, 1962 natans, 1963, 1979, 1991 Richard-

sonii, 2014 illinoensis, 2024 amplifolius, 2039 illinoensis, 2044 Richardsonii, 2046 nodosus, 2048 illinoensis, 2049 natans, 2050 gramineus, 2055 illinoensis, 2065 natans, 2076 illinoensis, 2093 praelongus, 2105 gramineus, 2107 illinoensis, 2113 natans, 2124 Richardsonii, 2132 praelongus, 2147 illinoensis, 2187 gramineus, 2201 natans, 2209, 2210 amplifolius, 2211 natans, 2226 Richardsonii, 2242, 2250 amplifolius, 2251, 2252 illinoensis, 2253 gramineus × illinoensis, 2254, 2255 amplifolius, 2256 gramineus × illinoensis, 2259 gramineus, 2291 praelongus, 2302 natans, 2311 perhaps praelongus × sp., 2316 praelongus, 2317 illinoensis, 2318 gramineus, 2321 amplifolius, 2324, 2326 gramineus, 2340 Richardsonii, 2341 illinoensis, 2342 natans, 2345 illinoensis, 2352 nodosus, 2353 Richardsonii, 2356, 2370 illinoensis, 2371 praelongus, 2373 gramineus × illinoensis, 2377, 2379 illinoensis, 2381, 2387 praelongus, 2388, 2396 illinoensis.

Metcalf & Sperry. 1603 perfoliatus v. bupleuroides, 1621 amplifolius, 1622, 1630 nodosus, 1631 crispus, 1634, 1639 amplifolius, 1684 gramineus × perfoliatus v. bupleuroides, 1690 illinoensis.

Michel. 1356 perfoliatus v. bupleuroides, 1993 amplifolius.

Millman. 2976 gramineus.

Millspaugh, C. F. 457 nodosus.

Moffatt, W. S. 294 amplifolius.

Moldenke, H. N. 752 illinoensis, 4207 gramineus v. maximus, 4208, 9396 nodosus, 9397 perfoliatus v. bupleuroides.

Moore, A. H. 89 natans, 945 crispus, 2488 amplifolius, 5022 gramineus, 5036 amplifolius.

Moore, E. 1488 natans.

Moore, G. 81 amplifolius.

Moore & Steyermark. 3667 illinoensis.

Morris, E. L. A41 natans, 1343 perhaps gramineus × nodosus (possibly illinoensis × nodosus).

Mosier, C. A. 352 illinoensis.

Moyle, J. B. 61a Richardsonii, 894 alpinus v. tenuifolius, 2052 illinoensis, 2261 amplifolius.

Muenscher, W. C. 2739 crispus, 7632 natans, 7633, 7634, 7635 amplifolius, 7640 gramineus approaching v. myriophyllus, 7642 gramineus, 7643, 7644 natans, 7647 praelongus, 7653, 7654, 7655 Richardsonii, 7657a, 7658 alpinus v. tenuifolius, 10202 natans, 10204 Richardsonii, 10207 gramineus, 10208 gramineus × illinoensis, 10209, 10210, 10211 gramineus, 10212 gramineus × illinoensis, 10216 gramineus, 10218 Richardsonii, 17098 illinoensis, 17104, 17106 gramineus, 17121 Richardsonii, 17545 illinoensis, 17550 gramineus, 17556 praelongus, 17671 natans, 17676 praelongus, 17678 Richardsonii.

Muenscher & Bechtel. 433 nodosus, 434 gramineus, 459 Richardsonii.

Muenscher & Burkholder. 16401 illinoensis, 16846 crispus, 16885 Richardsonii.

Muenscher & Clausen. 3751, 3752 nodosus, 3756 illinoensis, 3757, 3758, 3759 perfoliatus v. bupleuroides, 3770 gramineus v. maximus, 3772 gramineus (perhaps v. myriophyllus), 3773 gramineus approaching v. myriophyllus, 3775 gramineus v., 3784 perhaps amplifolius × Richardsonii, 4161, 4164 amplifolius, 4167 perfoliatus v. bupleuroides, 4190 gramineus, 4205 praelongus, 4209 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii, 4210 perfoliatus v. bupleuroides, 4232, 4233, 4235, 4238 illinoensis.

Muenscher & Curtis. 4827, 4828 nodosus, 4841 gramineus v. maximus, 5423 amplifolius, 5425, 5427 illinoensis, 5430, 5433, 5436 perfoliatus v. bupleuroides, 5466 praelongus, 4835 illinoensis, 4837 amplifolius, 4839, 4843, 4844 illinoensis, 4876 gramineus approaching v. myriophyllus, 4877, 4880 gramineus, 4900 praelongus, 4918 perhaps gramineus × perfoliatus v. bupleuroides.

Muenscher & Lindsey. 2712 alpinus v. tenuifolius, 2715 perhaps gramineus × nodosus, 2716 nodosus, 2719, 2723, 2724 amplifolius, 2725a illinoensis, 2726 perhaps perfoliatus v. bupleuroides × Richardsonii, 2728, 2730, 2732 perfoliatus v. bupleuroides, 2739 crispus, 2769 gramineus v. maximus, 2770

gramineus × perfoliatus v. bupleuroides, 2775 gramineus v. myriophyllus, 2777 gramineus approaching v. maximus, 2780 gramineus approaching v. myriophyllus, 2782 gramineus, 2785 gramineus approaching v. myriophyllus, 2786 gramineus × illinoensis, 2788 natans, 2799 Oakesianus, 2814a praelongus, 2814b perhaps amplifolius × praelongus, 2819, 2820 praelongus, 2830 Richardsonii, 2863 alpinus v. tenuifolius, 2865 gramineus × perfoliatus v. bupleuroides.

Muenscher & Maguire. 713, 715 gramineus v. maximus, 717, 718, 719, 721, 722, 723 amplifolius, 726 alpinus v. tenuifolius, 729 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii), 730, 732 perfoliatus v. bupleuroides, 778 gramineus, 781 gramineus approaching v. maximus, 782 gramineus, 787 gramineus approaching v. maximus, 789, 793 gramineus, 796, 797, 800, 804, 805, 809, 812, 813 natans, 825, 827, 829, 831, 834 praelongus, 857, 858 gramineus, 1582 perhaps gramineus × perfoliatus v. bupleuroides, 1583, 1588, 1591, 1592 nodosus, 1593, 1593a, 1594, 1599, 1600, 1601 amplifolius, 1604b, 1605, 1606 illinoensis, 1607c, 1608, 1609 perfoliatus v. bupleuroides, 1618 crispus, 1676 illinoensis, 1677, 1679 gramineus, 1680 illinoensis, 1683 gramineus, 1684 gramineus × illinoensis, 1686, 1689, 1690 gramineus, 1691 gramineus approaching v. maximus, 1692, 1693 gramineus v. maximus, 1695 gramineus, 1696 gramineus approaching v. maximus, 1699 gramineus, 1700, 1701 illinoensis, 1703, 1705, 1706, 1709, 1710 natans, 1711, 1715, 1716, 1717 Oakesianus, 1747, 1748 praelongus, 1751 illinoensis, 1753, 1754, 1756 praelongus, 1773, 1775, 1776, 1779, 1781, 1782 Richardsonii, 1783 perhaps perfoliatus v. bupleuroides × Richardsonii, 1787 Richardsonii, 1806 illinoensis.

Muenscher, Manning & Maguire. 67, 71 amplifolius, 73, 75 gramineus × illinoensis, 120 gramineus approaching v. maximus, 141 praelongus, 157 perhaps perfoliatus v. bupleuroides × Richardsonii.

Muenscher & Wiegand. 14538 perhaps gramineus × sp.

Munz, P. A. 2785 crispus, 10805 illinoensis.

Murdoch, J. 524 perfoliatus v. bupleuroides, 939 amplifolius, 2062 Oakesianus.

Nash, G. V. 786 crispus, 859, 1750 illinoensis.

Nelson, A. 2276 Richardsonii, 2406 gramineus v., 4145 natans.

Nelson, A. & E. 6061 gramineus v. maximus, 6770 natans (ecological form, perhaps a hybrid), 6771 perhaps gramineus × illinoensis, 6807 Richardsonii.

Nelson, A. & Ruth A. 973 praelongus.

Nelson, E. 87, 3362 Richardsonii, 3386 illinoensis.

Nelson, J. C. 1840 Richardsonii.

Nichols, G. E. 694 perfoliatus v. bupleuroides, 749, 875 natans, 876 gramineus, 1037 gramineus × perfoliatus v. bupleuroides.

Northrop, J. I. 79 natans.

Ogden, E. C. 914, 964 gramineus v. maximus, 1502 crispus, 1620 natans, 1701 perfoliatus v. bupleuroides, 1702 alpinus v. tenuifolius, 1704 amplifolius, 1705 natans, 1716 gramineus, 1717 Richardsonii, 1718 natans, 1725 alpinus v. tenuifolius, 1887 Oakesianus.

Ogden & Babel. 2166 Oakesianus, 2203 gramineus.

Ogden, Babel & Chamberlain. 2242 alpinus v. tenuifolius.

Ogden, Babel & Kozicky. 1880 praelongus.

Ogden & Bolan. 1560, 1562 Oakesianus, 1565 natans, 1568 nodosus, 1569 illinoensis, 1571 perfoliatus v. bupleuroides (perhaps perfoliatus v. bupleuroides × Richardsonii), 1578 gramineus × perfoliatus v. bupleuroides, 1580 natans, 1582 Richardsonii, 1583 amplifolius, 1584 nodosus, 1589 Richardsonii, 1589½ illinoensis × nodosus, 1590, 1629, 1630 nodosus, 1631, 1643 Richardsonii, 1644, 1645 gramineus, 1646 natans, 1647 amplifolius, 1676 natans, 1677 gramineus, 1678 Richardsonii, 1680 gramineus, 1681 gramineus × Richardsonii.

Ogden & Hubert. 1537 perfoliatus v. bupleuroides, 1538 crispus.

Ogden & Marston. 432 perfoli-

atus v. bupleuroides, 492 praelongus, 493 perfoliatus v. bupleuroides, 1691 gramineus, 1692, 1693 amplifolius, 1694 gramineus v. maximus, 1698 gramineus.

Ogden, E. C. & Edith B. 1762 gramineus × illinoensis, 1765 gramineus v. myriophyllus, 2008 perfoliatus v. bupleuroides, 2013 gramineus, 2016 amplifolius, 2020 praelongus, 2032 perfoliatus v. bupleuroides.

Ogden, Ogden & Babel. 2271 natans, 2272 amplifolius, 2294 Richardsonii, 2308 gramineus.

Ogden, Ogden & Steinmetz. 1882 praelongus.

Ogden & Palmer. 1505 perfoliatus v. bupleuroides, 1506 natans.

Ogden, Rollins & Wiggins. 1731 Berchtoldi × perfoliatus v. bupleuroides, 1732 perfoliatus v. bupleuroides.

Ogden & Steinmetz. 1542 natans, 1543 gramineus v. maximus, 1544 perfoliatus v. bupleuroides, 1544½ gramineus × perfoliatus v. bupleuroides, 1545 gramineus, 1547 amplifolius, 1548 natans, 1549 gramineus, 1552 gramineus v. maximus, 1556 amplifolius, 1592 praelongus, 1593, 1602, 1603 gramineus v. maximus, 1604 praelongus, 1605 perfoliatus v. bupleuroides (perhaps perfoliatus v. bupleuroides × Richardsonii), 1607 perhaps gramineus × nodosus, 1612 gramineus, 1613, 1614 amplifolius, 1615 natans, 1772 Oakesianus, 2189 gramineus v. maximus, 2190 nodosus, 2191 gramineus approaching v. maximus, 2192 perfoliatus v. bupleuroides, 2193 gramineus v. maximus, 2195 gramineus × perfoliatus v. bupleuroides.

Ogden, Steinmetz & Prince. 1596 nodosus, 1597 gramineus v. maximus.

Ogden & Trask. 2073 Oakesianus.

Ogden & Wiggins. 1729 amplifolius.

Ogden & Wright. 2342 gramineus × perfoliatus v. bupleuroides (perhaps alpinus × gramineus), 2343 alpinus v. tenuifolius, 2344 gramineus v. maximus.

Oosting, H. J. 291 gramineus, 302 Richardsonii, 2938, 2945 illinoensis, 2971 Richardsonii, 28100 gramineus, 28164 gramineus × illinoensis, 28166 gramineus.

Ostenfeld, C. H. 553 Richardsonii.

Osterhout, G. E. 2885 alpinus v. tenuifolius.

Otis, I. C. 1565 natans, 1583 Richardsonii, 1584 gramineus, 1678 Richardsonii, 1767 praelongus, 1768, 1769 amplifolius.

Over, W. H. 3366, 3367 Richardsonii, 4008 illinoensis, 4044 gramineus, 13817 alpinus v. tenuifolius approaching v. subellipticus, 13818 Richardsonii, 14459 amplifolius, 14460, 14464 Richardsonii, 14466 gramineus, 15425 amplifolius, 15867 gramineus approaching v. maximus, 17129 gramineus v., 17130, 17131, 17132, 17133, 17134, 17135, 17136, 17137 Richardsonii, 17138 gramineus, 17139 natans, 17140 gramineus, 17141, 17142 amplifolius, 17432 nodosus.

Palmer, E. J. 11952 nodosus, 12217 illinoensis, 12907 perhaps illinoensis × nodosus, 21526 nodosus, 33310 pulcher, 33707, 43586 nodosus.

Palmer, E. L. 36, 37, 38 natans, 50 Richardsonii.

Palmer, L. J. 638 gramineus v. maximus and Richardsonii, 1862 Richardsonii, 1866 gramineus.

Palmer & Steyermark. 41417 pulcher.

Pammel, L. H. 100 natans, 776 illinoensis.

Parish, S. B. 2106, 2128, 3350 nodosus, 3414 natans.

Parish, S. B. & W. F. 1435 natans.

Parlin, J. C. 1073 perfoliatus v. bupleuroides.

Parlin & Fernald. 924 natans.

Payson, E. 174 illinoensis.

Payson, E. B. & Lois B. 2023 Richardsonii, 2024 praelongus, 2251 natans.

Pease, A. S. 1919 alpinus v. subellipticus, 2011 pulcher, 2064 crispus, 2500 gramineus, 2589 gramineus v. maximus, 2907 alpinus v. tenuifolius, 3795 natans, 4699A Oakesianus, 5314A gramineus, 11982 Richardsonii, 12143 perfoliatus v. bupleuroides, 12171 Oakesianus, 13821 gramineus, 13883 amplifolius, 14012 praelongus, 14582 gramineus, 14585 amplifolius, 16591, 16943 perfoliatus v. bupleuroides,

17024 alpinus v. tenuifolius approaching v. subellipticus, 17185 amplifolius, 17270 alpinus v. tenuifolius approaching v. subellipticus, 17983 Richardsonii, 20073 natans, 22752, 22753, 22754 gramineus, 25217 natans, 26709 alpinus v. tenuifolius.

Pease & Bean. 26092 gramineus, 26094 Richardsonii, 26199 amplifolius, 26247 Richardsonii, 26304 gramineus, 26389 Richardsonii.

Pease & Edgerton. 27169 gramineus.

Pease & Fernald. 16958 amplifolius, 17024 alpinus v. tenuifolius approaching v. subellipticus, 17047 natans.

Pease & Hopkins. 22692 perfoliatus v. bupleuroides.

Pease & Ogden. 24828 Richardsonii, 24911 gramineus, 24918 Richardsonii, 24964 illinoensis, 24965 natans, 25013, 25031 Richardsonii, 25032 amplifolius, 25135 Oakesianus, 25167 amplifolius.

Peattie, D. C. 235 Richardsonii, 2305 gramineus v. myriophyllus.

Peck, C. H. 2 perhaps alpinus × nodosus, 3 illinoensis.

Peck, M. E. 6284 Richardsonii, 8514 natans, 9009 Richardsonii, 9026 amplifolius, 9619 Richardsonii.

Peebles, R. H. 14190 nodosus.

Pennell, F. W. 3351 perfoliatus v. bupleuroides, 16220 Richardsonii, 16332 gramineus, 16333 gramineus × illinoensis, 16664 gramineus.

Pepoon, H. S. 156, 159 illinoensis, 899 praelongus.

Perry & Roscoe. 38 Oakesianus.

Phelps, O. P. 1091 nodosus, 1092, 1655 perfoliatus v. bupleuroides, 1665 nodosus.

Pieters, A. J. 3 Richardsonii, 6 gramineus, 7 illinoensis.

Piper, C. V. 757 Richardsonii, 758 natans, 3684 amplifolius, 3761 gramineus × illinoensis, 3765 natans, 4426 alpinus v. tenuifolius, 4430 Richardsonii, 4431 gramineus approaching v. maximus.

Polunin, N. 1976, 1977, 2062 alpinus v. tenuifolius, 2070 perhaps alpinus × gramineus.

Pontious & Bartley. 18 nodosus.

Porsild, A. E. 4295 gramineus approaching v. maximus (perhaps gramineus × sp.), 4296 alpinus v. subellipticus.

Porsild, A. E. & R. T. 114 alpinus v. tenuifolius, 847 Richardsonii, 943, 1102 Richardsonii, 1131 gramineus, 1496 alpinus v. tenuifolius, 1497 gramineus, 2955 praelongus, 3098 alpinus v. tenuifolius and Richardsonii, 3099, 5174 gramineus v. maximus.

Prince & Atwood. 1318 Oakesianus, 1405 perfoliatus v. bupleuroides.

Prince & Hyland. 649 gramineus.

Proulx, T. 58 alpinus v. tenuifolius.

Rand & Robinson. 1013 pulcher

Randolph & Wiegand. 9094 nodosus.

Rapp, F. W. 1977, 1979 praelongus, 1990, 2005, 2008 amplifolius, 2031 natans, 2035 amplifolius, 2221 natans, 2232 amplifolius, 2238, 2251, 2262 natans, 2267, 2273, 2292 amplifolius.

Rau, E. A. 88 perfoliatus v. bupleuroides.

Raup, H. M. 1545 perhaps alpinus v. subellipticus, 1546 gramineus v. maximus, 1547 gramineus × Richardsonii, 1548 gramineus v. maximus, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560 Richardsonii, 1570, 1571, 1572 praelongus, 6352, 6497-a Richardsonii. 6498-a alpinus v. tenuifolius, 6617 Richardsonii, 6618, 6621, 6622, 6741 alpinus v. tenuifolius, 6742 alpinus v. subellipticus, 6823, 6849, 7002 gramineus.

Raup & Abbe. 4038 gramineus, 4313 natans, 4614 gramineus, 4666 Richardsonii.

Redfield, J. H. 7996 pulcher, 8002 perfoliatus v. bupleuroides, 8014 alpinus v. subellipticus, 15341 perfoliatus v. bupleuroides.

Reed, E. L. 3168 nodosus.

Reverchon, J. 1640 illinoensis, 2502 pulcher.

Ricard & Boivin. 342 nodosus.

Ricker, P. L. 600 natans.

Rider, Sadie L. 349 Richardsonii.

Ridgway, R. 3318 nodosus.

Ridgway & Eaton. 3425 nodosus.

Riehl, N. 128 pulcher.

Robinson, B. L. 494 natans.

Robinson & Maxon. 114 natans.

Robinson & Schrenk. 207 perfoliatus v. bupleuroides, 231 poly-

gonifolius, 232 gramineus approaching v. maximus.

Robinson & Webb. 1087 perfoliatus v. bupleuroides (perhaps a hybrid).

Rolland-Germain. 6231 gramineus, 6233, 6235 gramineus v. maximus, 6280 amplifolius, 8696 perfoliatus v. bupleuroides, 8697, 13044 amplifolius, 16055 Richardsonii, 16058 alpinus v. tenuifolius, 16061 natans, 19251 gramineus approaching v. maximus, 19269 nodosus, 43354, 43356 Richardsonii, 43357 perfoliatus v. bupleuroides, 43358 perhaps alpinus × perfoliatus v. bupleuroides, 43359 nodosus, 43360 perhaps gramineus × perfoliatus v. bupleuroides, 43361 gramineus × perfoliatus v. bupleuroides, 43363 natans, 43367, 43368, 43376 gramineus × perfoliatus v. bupleuroides, 43377 perhaps gramineus × perfoliatus v. bupleuroides, 43378 gramineus × perfoliatus v. bupleuroides, 43379, 43380, 43381 perhaps gramineus × perfoliatus v. bupleuroides, 43382 gramineus × perfoliatus v. bupleuroides, 43481 Richardsonii.

Rollins, R. C. 2319 alpinus v. tenuifolius.

Rollins & Chambers. 2590 natans.

Rose & Painter. 8205 nodosus.

Rosendahl, C. O. 790 natans.

Rosendahl & Butters. 4638 gramineus v. maximus.

Rosenvinge, L. K. 2990 gramineus.

Rossbach, G. B. 51 gramineus v., 55 natans, 59 alpinus v. subellipticus, 60 natans, 61, 62, 63 amplifolius, 70, 71, 72 gramineus, 73 gramineus v. maximus, 74 perfoliatus v. bupleuroides, 75 gramineus, 76, 77, 78 perfoliatus v. bupleuroides, 82 praelongus.

Rossbach, G. B. & R. P. 16 alpinus v. tenuifolius, 17 gramineus, 20 gramineus v. maximus.

Rothrock, J. T. 67 Richardsonii.

Rouleau, E. 304 nodosus, 1185 perfoliatus v. bupleuroides.

Roush, Eva M. F. 812 natans.

Rousseau, J. 20444, 20445 gramineus × perfoliatus v. bupleuroides, 20448 amplifolius, 25814 Oakesianus, 25817, 30003 natans, 30004 praelongus, 31207, 32297 gramineus, 32332 alpinus v. tenuifolius, 32393 perhaps gramineus × perfoliatus v. bupleuroides, 35293 Oakesianus, 35812 perfoliatus v. bupleuroides.

Rugel, F. 613 illinoensis.

Rust, H. J. 384 alpinus v. subellipticus, 385 natans.

Ruth, A. 49, 56, 141, 772 nodosus.

Rydberg, P. A. 1421 nodosus, 1440 illinoensis, 1652 natans, 1792 Richardsonii, 1846 nodosus.

Rydberg & Bessey. 3724, 3725 alpinus v. tenuifolius.

Rydberg & Carlton. 7522 Richardsonii.

St. Cyr, D. N. 2973 gramineus, 2994 amplifolius, 3030 nodosus, 3050 Richardsonii.

St. John, H. 1121, 1122 polygonifolius, 1124 perfoliatus v. bupleuroides, 1372 natans, 1373 Oakesianus, 1756 alpinus v. subellipticus, 1758 gramineus approaching v. maximus, 2540, 2542 perfoliatus v. bupleuroides, 11919 gramineus v. myriophyllus, 90081 natans, 90083, 90084 alpinus v. tenuifoliius, 90085 alpinus v. subellipticus, 90086 gramineus, 90087 perfoliatus.

St. John, English, Moore & Palmer. 9740 natans.

St. John & Nichols. 2104 alpinus v. tenuifolius, 2105 perfoliatus v. bupleuroides, 2106 natans, 2107 praelongus, 2108 amplifolius, 2109 gramineus v. maximus.

Sandberg, J. H. 33 amplifolius, 225 Richardsonii, 498 gramineus, 636 Richardsonii, 656, 658 amplifolius, 801 Richardsonii, 4927 praelongus.

Sandberg & Leiberg. 524 gramineus v. maximus.

Sandberg, MacDougal & Heller. 697, 939 natans, 955 gramineus, 956 Richardsonii, 1026 gramineus.

Sanford, S. N. F. 1225, 10192 perfoliatus v. bupleuroides.

Sargent, H. E. 29 perfoliatus v. bupleuroides, 31 gramineus × perfoliatus v. bupleuroides, 33 perfoliatus v. bupleuroides.

Schulz, Ellen D. 797 illinoensis.

Scott, W. 16208 crispus, 16431 nodosus, 16432 amplifolius, 16433, 16434 illinoensis, 16438, 16439 crispus, 16443 gramineus, 16444 gramineus v. maximus, 16446,

16447 gramineus, 16448 illinoenis, 16450 gramineus, 16451 praelongus, 16454, 16455, 16457 Richardsonii.

Scovell, J. T. 26 amplifolius and natans, 27a Richardsonii, 28 amplifolius, 32 nodosus, 37 gramineus × illinoensis, 44 gramineus, 45 praelongus, 53 (this number also a linear-leaved species according to Fernald, Mem. Am. Acad. Arts & Sci. 17: pt. 1: 136), 54 illinoensis, 66 praelongus.

Scovell & Clark. 1057 Richardsonii, 1079 illinoensis, 1221 gramineus, 1223 amplifolius, 1321 praelongus.

Seargent, M. 100 nodosus.

Seymour, F. C. 249 amplifolius, 267, 1027 perfoliatus v. bupleuroides, 1487, 1567, 1568 Oakesianus, 1570 perfoliatus v. bupleuroides, 3868 praelongus, 4151 pulcher, 4941 gramineus approaching v. myriophyllus.

Sharp, W. M. 3 Richardsonii, 11 illinoensis, 73, 100 natans, 101 praelongus.

Sharp & Underwood. 33521 nodosus.

Sharples, S. P. 303 nodosus.

Shaw, C. H. 771 Richardsonii, 1200 natans and gramineus.

Shear, C. L. 3745 nodosus, 3804 praelongus, 4524 alpinus v. tenuifolius.

Shear & Bessey. 5328 alpinus v. tenuifolius, 5333 gramineus × Richardsonii.

Shreve, F. 1597, 1622 pulcher.

Shull, G. H. 15 crispus, 39, 95 nodosus, 96 perfoliatus v. bupleuroides, 97 amplifolius, 198 nodosus, 316 perfoliatus v. bupleuroides, 413 amplifolius, 421 nodosus, 431, 456 perfoliatus v. bupleuroides, 465 crispus, 469 perfoliatus v. bupleuroides, 471 illinoensis × nodosus, 473 amplifolius, 474 nodosus.

Shunk & Manning. 70 Richardsonii, 80 praelongus, 83 natans, 220 Richardsonii, 225 natans, 229 praelongus, 236 Richardsonii, 237 illinoensis, 298 gramineus, 307 illinoensis, 328 gramineus, 337 natans, 368 praelongus, 398 Richardsonii, 410 praelongus, 492 Richardsonii, 495 illinoensis, 505 praelongus, 511 Richardsonii, 553 amplifolius, 560 Richardsonii.

Simpson, J. H. 386 illinoensis.

Small, J. K. 7241, 8170 illinoensis.

Small & Carter. 1007, 1118 illinoensis.

Small, J. K. & G. K. 4143, 4437, 4486 illinoensis.

Smiley, F. J. 330 natans, 749 nodosus.

Smith, E. F. 57 praelongus.

Smith, L. B. 632 natans.

Smith & Pound. 228 natans.

Sones, G. D. 307 nodosus.

Sperry, C. C. 509 pulcher.

Sperry & Martin. 671 Richardsonii, 696 praelongus, 718 Richardsonii, 719 gramineus, 731, 735 illinoensis.

Spreadborough, W. 16429 alpinus v. tenuifolius, 20750 gramineus, 62662, 62663 Richardsonii.

Standley, P. C. 7557 gramineus v., 9780 nodosus, 16855, 17398 alpinus v. tenuifolius, 18500 natans, 18528 amplifolius, 40488 illinoensis, 40649 gramineus.

Standley & Killip. 7648 amplifolius, 7649 nodosus.

Stecker, A. 332 alpinus v. tenuifolius.

Steenis, J. H. 4741 alpinus v. tenuifolius, 4781 Richardsonii.

Steinmetz, F. H. 94 amplifolius, 149 gramineus × sp., 320 gramineus × perfoliatus v. bupleuroides (perhaps alpinus × gramineus), 323 alpinus v. tenuifolius, 351 gramineus, 356 gramineus v. maximus, 357 gramineus × sp., 358 gramineus, 365 gramineus v. maximus, 367 amplifolius, 370 gramineus, 374 perfoliatus v. bupleuroides, 381 gramineus, 385 perfoliatus v. bupleuroides, 404 gramineus v., 412 amplifolius, 420, 526 perfoliatus v. bupleuroides, 527 perhaps gramineus × nodosus, 617 Berchtoldi × perfoliatus v. bupleuroides, 626 amplifolius, 627 gramineus, 630 natans, 732 gramineus v. maximus, 791 perhaps perfoliatus v. bupleuroides × Richardsonii, 830 natans, 950 amplifolius, 957 nodosus, 1127 Oakesianus.

Steinmetz & Babel. 888 gramineus × perfoliatus v. bupleuroides, 889 perfoliatus v. bupleuroides, 905 nodosus.

Steinmetz & Marston. 539 Berchtoldi × perfoliatus v. bupleuroides.

Steinmetz & Ogden. 98 amplifolius.
Steinmetz & Quimby. 581 gramineus, 582 praelongus.
Steinmetz & Swanson. 30 natans, 31 nodosus, 55 gramineus.
Stevens, G. W. 1364 amplifolius and nodosus.
Steyermark, J. A. 1003 natans, 4227 crispus, 4327 pulcher, 4473 natans, 4609 illinoensis, 4639, 4688, 4728 amplifolius, 5410 nodosus (perhaps illinoensis × nodosus), 5411, 9233 nodosus, 11323, 11939 illinoensis, 11946 amplifolius, 12031, 12428 illinoensis, 13782, 13869 amplifolius, 13910, 13938, 14226 illinoensis, 14245 pulcher, 14257, 14259 nodosus, 14285 illinoensis, 14487, 14624, 15560 amplifolius, 16313 crispus, 21087, 21138, 21145 illinoensis, 21208 amplifolius, 21235 illinoensis, 21269 amplifolius, 22031 nodosus, 22773, 22840, 22873, 23321, 23365 amplifolius, 23494, 23543, 23546 amplifolius, 24650 nodosus, 25008 amplifolius, 25009 illinoensis, 25102, 25103 nodosus, 25104, 25142 illinoensis, 25249, 25250, 25317 nodosus, 25365 illinoensis, 25367 nodosus, 25370 illinoensis, 25425 nodosus, 25533 amplifolius, 25534, 25603, 25876, 27148, 27635, 27657, 27901 nodosus, 27967, 28004, 28005 illinoensis, 28009a nodosus, 28026, 28034a, 28044 illinoensis, 28071 amplifolius, 28080 illinoensis.
Street & Williams. 2689 nodosus.
Suksdorf, W. N. 728 nodosus, 2172 alpinus v. tenuifolius.
Svenson, H. K. 156 pulcher, 7216 nodosus, 9108, 9427, 10150 pulcher.
Svenson & Fassett. 932 perfoliatus v. bupleuroides, 933 perfoliatus, 934 nodosus, 3025 gramineus × perfoliatus v. bupleuroides, 3028 alpinus v. subellipticus, 3030 gramineus × perfoliatus v. bupleuroides, 3031 3040 perfoliatus v. bupleuroides, 3045 Richardsonii, 3046 gramineus.
Svenson & Smith. 822 perfoliatus v. bupleuroides.
Tanner, V. M. 5786 praelongus × Richardsonii.
Taylor, W. P. 78 gramineus × illinoensis.
Taylor, Hosie, Fitzpatrick, Losee & Leslie. 280 amplifolius, 291 gramineus, 293 Richardsonii, 294 alpinus v. subellipticus, 295, 296 natans, 297 Oakesianus, 299 gramineus, 300 Richardsonii, 303 gramineus, 304 gramineus × Richardsonii (probably backcrossed with gramineus), 305 gramineus.
Tharp, B. C. 2181 illinoensis.
Thomas, C. C. 1494 perhaps gramineus × nodosus, 1499 gramineus, 3466 perfoliatus v. bupleuroides (perhaps perfoliatus v. bupleuroides × Richardsonii).
Thompson, H. D. 8 Richardsonii.
Thompson, J. W. 7589 gramineus, 7594 Richardsonii, 8620 amplifolius, 9422½ natans, 11768 gramineus v. maximus, 14046g ramineus.
Thomson, R. 2 praelongus, 5 Richardsonii, 7 natans, 16 gramineus, 53 illinoensis, 69 gramineus, 73b gramineus × illinoensis, 142 Richardsonii, 145 illinoensis, 153 gramineus, 222 Richardsonii, 232 natans, 253 gramineus, 299 Richardsonii, 361, 365 gramineus, 369 Richardsonii, 382 natans.
Thurber, G. 48 illinoensis.
Tidestrom, I. 517, 1861 illinoensis, 7171 nodosus, 7175 perfoliatus v. bupleuroides, 7183, 7637, 7741, 10655 nodosus.
Tolstead, W. L. 428 natans, 429 Richardsonii, 430 praelongus, 473 Richardsonii, 614 illinoensis, 615 gramineus, 616 gramineus × illinoensis, 637 nodosus, 638 natans, 41500 nodosus.
Topping, D. L. 203 amplifolius.
Toumey, J. W. 496 nodosus.
Tracy, J. P. 4406 natans.
Trelease, W. 2865, 2867 gramineus, 2870, 2871 alpinus v. tenuifolius.
Tweedy, F. 45 illinoensis, 411 gramineus, 413 Richardsonii, 4978 gramineus.
Uhler & McLaughlin. 362, 373 Richardsonii, 375, 1091 gramineus × illinoensis.
Uhler & Martin. 1645 Richardsonii, 1656 gramineus, 1659 Richardsonii, 1660 natans, 1662 illinoensis, 1666 gramineus (perhaps gramineus × illinoensis).
Uhler & Warren. 793 natans, 797½ praelongus, 858 illinoensis, 1079 praelongus.

Umbach, L. M. 31 gramineus, 433 Richardsonii, 457 gramineus v. maximus.
Van Dyke, E. C. 202 alpinus v. tenuifolius.
VanEseltine & Moseley. 201 crispus, 202 nodosus.
Victorin, Marie- 526 gramineus, 565 perfoliatus v. bupleuroides, 1124 gramineus, 1152, 1505 alpinus v. tenuifolius, 1537 natans, 1539 gramineus, 3177 perfoliatus v. bupleuroides, 3231 Richardsonii, 4195, 7330 gramineus, 8176 gramineus × perfoliatus v. bupleuroides, 8177, 8178 perfoliatus v. bupleuroides, 8179 Richardsonii, 8187, 8192, 8193 gramineus, 8194, 8195 gramineus v. maximus, 9924, 10104 perfoliatus v. bupleuroides, 11160 natans, 11162 alpinus v. tenuifolius, 11165 perfoliatus v. bupleuroides approaching v. typicus, 11166 perhaps alpinus × perfoliatus v. bupleuroides, 11169 perhaps gramineus × perfoliatus v. bupleuroides, 11170 perfoliatus v. bupleuroides, 16052 natans, 16056 Richardsonii, 16057 gramineus, 16062, 16063 natans, 16064 gramineus v. maximus, 16065 amplifolius, 18460 alpinus v. tenuifolius, 18462 Richardsonii, 20451 gramineus, 20452 gramineus v. maximus, 20454 perfoliatus, 20456 perfoliatus v. bupleuroides, 20457, 21201, 25815 amplifolius, 27897 perfoliatus v. bupleuroides, 28603 gramineus, 28604 gramineus × perfoliatus v. bupleuroides, 28605 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii).
Victorin & Rolland. 9922 Oakesianus, 9923 alpinus v. subellipticus, 9924 perfoliatus v. bupleuroides, 18575 alpinus v. subellipticus, 18576 gramineus, 20462, 20468 alpinus v. subellipticus, 25609, 25810 gramineus, 25938 alpinus v. subellipticus, 25939, 27094, 27095 gramineus v. maximus, 27630 alpinus v. tenuifolius, 29088 perfoliatus v. bupleuroides, 33178 Richardsonii (perhaps perfoliatus v. bupleuroides × Richardsonii), 33180 gramineus v. maximus, 33879 perfoliatus v. bupleuroides, 43565 nodosus, 43576, 43796 perfoliatus v. bupleuroides, 44070 natans, 44738 gramineus × perfoliatus v. bupleuroides, 45184 Richardsonii, 45189 crispus, 46699 nodosus, 49141 crispus, 49148 Richardsonii, 49304 nodosus, 49366 amplifolius.
Victorin, Rolland, Brunel & Rousseau. 17278 perfoliatus v. bupleuroides, 17285 gramineus approaching v. maximus, 17286 perfoliatus v. bupleuroides.
Victorin, Rolland & Jacques. 33315 alpinus v. subellipticus, 33316 natans, 33393 perfoliatus approaching v. bupleuroides, 33477 gramineus, 33517 amplifolius, 33518 praelongus, 33609 Richardsonii, 33639 Oakesianus, 33838 praelongus, 33854, 33856 natans, 33858 amplifolius, 33879 perfoliatus v. bupleuroides, 33714, 33855 gramineus, 44182 praelongus, 44451 alpinus v. subellipticus, 44452 gramineus, 44453 gramineus × perfoliatus v. bupleuroides (probably backcrossed with gramineus), 44454, 44458 gramineus, 44459 gramineus × perfoliatus v. bupleuroides, 44460 natans, 44463 gramineus v., 44465 gramineus, 44467 perfoliatus v. bupleuroides, 44468 alpinus v. subellipticus, 44749 Oakesianus.
Victorin, Rolland & Louis-Marie. 20467 alpinus v. subellipticus.
Victorin, Rolland & Meilleur. 43730 alpinus v. tenuifolius, 43858 nodosus, 44382 gramineus v. or gramineus × sp., 44728 natans, 45446 Richardsonii.
Victorin, Rolland, Michel & Meilleur. 43633 Oakesianus.
Waghorne, A. C. 6 alpinus v. tenuifolius, 40 perfoliatus v. bupleuroides.
Wahl, H. A. 174 amplifolius, 204 perfoliatus, v. bupleuroides, 240 perfoliatus v. bupleuroides (perhaps perfoliatus v. bupleuroides × sp.).
Walker, Mr. & Mrs. E. P. 994 natans.
Ware, R. A. 2446 perfoliatus v. bupleuroides, 3324 natans, 3326 amplifolius.
Warnock, B. H. T557 nodosus.
Watson, S. 396 perhaps alpinus × gramineus, 397 Richardsonii, 398 nodosus, 1131 natans, 1132 alpinus v. tenuifolius, 1133 nodosus (perhaps illinoensis × nodosus), 1134 gramineus, 1135 Richardsonii.
Watson, W. R. 969 gramineus, 973

gramineus approaching v. maximus, 979 natans, 1006 amplifolius, 1023 Richardsonii, 1178 amplifolius, 1253, 1418 gramineus, 3142 natans, 3144, 3145 alpinus v. subellipticus, 3158 gramineus, 3651 Richardsonii.

Weatherby, C. A. D2409 amplifolius, 3389 gramineus, 4364 natans.

Weatherby & Anderson. 5901 amplifolius, 5904 natans.

Weatherby, C. A. & Una F. 5625 gramineus approaching v. maximus, 6624 gramineus.

Webb, R. J. 452, 546 amplifolius.

Webber, H. J. 4 amplifolius, 5, 6 nodosus.

Welch, Winona H. 2106 nodosus.

Werner, W. C. 954 illinoensis.

Wetmore, A. 395 nodosus, 541 natans, 549 gramineus v. maximus, 550 gramineus.

Wetmore, R. H. 103096 gramineus v. maximus.

Wetmore. 2988 gramineus.

Wheeler, C. F. 7 natans, 10 praelongus, 11, 12 illinoensis, 13 amplifolius, 16 illinoensis, 19 Richardsonii, 21, 24 illinoensis, 26 alpinus v. tenuifolius, 27 gramineus, 89 Richardsonii, 90 alpinus v. tenuifolius, 231 illinoensis, 273 praelongus.

Wheeler, L. C. 1974 nodosus, 3973 natans.

Whited, K. 3141 Richardsonii.

Whitford, H. N. 251 gramineus, 254 natans, 258 alpinus v. tenuifolius.

Whitney, Elsie G. 4673a amplifolius.

Wiegand, K. M. 11178 illinoensis, 11182 crispus.

Wiegand, Gilbert & Hotchkiss. 27339 Oakesianus.

Wiegand & Hotchkiss. 27337 alpinus v. tenuifolius, 27343 gramineus × perfoliatus v. bupleuroides (probably backcrossed with gramineus).

Wiegand & Pease. 27340 gramineus.

Wight, W. F. 1 praelongus, 8 illinoensis, 9 natans, 59 illinoensis, 61 gramineus, 76 illinoensis, 86, 87a, 87b, 87c, 88 nodosus, 97 amplifolius, 98 nodosus, 109 amplifolius, 123 nodosus, 152 natans.

Wiggins, I. L. 6757 natans, 6775 gramineus v. maximus, 6777 natans, 6796 gramineus, 6797 natans.

Williams, R. S. 285 nodosus, 804 Richardsonii, 900 gramineus.

Williams, T. A. 1 nodosus, 344 amplifolius.

Williamson, C. S. 418 Oakesianus, 455 polygonifolius, 472, 1026 perfoliatus v. bupleuroides.

Williamson, Mrs. W. T. 309 nodosus.

Wilson, P. 189 amplifolius.

Wolf, J. 760 alpinus v. tenuifolius, 961 gramineus.

Wolff, Simon E. 3290 nodosus.

Wood, F. F. 4 Richardsonii.

Wright, C. 675 nodosus, 676 illinoensis, 1893 nodosus.

Young, J. P. 542 illinoensis.

Yuncker, T. G. 361 amplifolius, 713 praelongus.

Yuncker, T. G. & E. C. 7011 Richardsonii.

Zeller, S. M. & E. B. 1237 gramineus, 1238 amplifolius.

INDEX

New scientific names are printed in full-face type

Potamogeton subg. Coleogeton, 71, 192, sect. Connati, 70, sect. Convoluti, 71; subg. Eupotamogeton, 71, 192, sect. Axillares, 71, sect. Adnati, 71; subsect. Alpini, 63, 68, 69, 71, 72, 76; subsect. Amplifolii, 63, 68, 69, 71, 72, 76, 132; subsect. Colorati, 60, 63, 68, 69, 71, 72, 76; subsect. Compressi, 71; subsect. Crispi, 60, 61, 68, 69, 71, 72, 76; subsect. Filiformes, 70; subsect. Hybridi, 71, ser. Euhybridi, 71; subsect. Javanici, 71; subsect. Lucentes, 60, 61, 63, 64, 68, 69, 71, 73, 76, 133, 158, 159; subsect. Monticoli, 71; subsect. Natantes, 60, 63, 68, 69, 71, 74, 76; subsect. Nodosi, 61, 63, 68, 69, 71, 73, 76, 134; subsect. Nuttalliani, 71; subsect. Oxyphylli, 71; subsect. Pectinati, 71; subsect. Perfoliati, 60, 61, 63, 64, 68, 69, 71, 74, 76; subsect. Praelongi, 60, 61, 63, 68, 69, 71, 74, 76; subsect. Pusilli, 71, ser. Pusilli connati, 71, subser. Foliosi, 71, subser. Panormitani, 71, ser. Pusilli convoluti, subser. Acuti, 71, subser. Obtusi, 71; subsect. Serrulati, 71; subsect. Vaginati, 71; group Amplifolii, 192; alpinus, 58, 61, 62, 71, 72, 76, 89, 90, 94–97, 138, 184, 191, var. Faxoni, 183, 185, proles microstachys, 92, var. **subellipticus,** 90–**94,** 97, 98, 195, pl. 746, subsp. tenuifolius, 92, var. **tenuifolius, 90,** 91, 95, 97, 157, 183, 195, pl. 746; alpinus × americanus, 183, 185; alpinus × Claytonii, 185; alpinus × gramineus, 183, 190; alpinus × nodosus, 183; alpinus × pensylvanicus, 185; americanus, 123, 186, var. novaeboracensis, 124; americanus × alpinus, 186; americanus × pensylvanicus, 185, 186; amplifolius, 59–62, 69, 71, 72, 75, 95, 99, 100, 104, 122, 123, 127, 128, 137, 184, 195, 196, pls. 746, 748, var. amphibius, 100, 120, forma amphibius, 100, 105, 120, 123, forma homophyllus, 100, var. ovalifolius, 100, 104. 120, 123; amplifolius × illinoensis, 184; amplifolius × praelongus, 184; amplifolius × Richardsonii, 184; angustifolius, 157, 158, 187, var. connecticutensis, 154, var. methyensis, 191; × argutulus, 185, formseries nodosifolius, 185; Berchtoldi, 71, 192, 194, Berchtoldi × perfoliatus, var. bupleuroides, 68, 193; Berchtoldi, var. tenuissimus, 195, var. tenuissimus × perfoliatus, var. bupleuroides, 196, pl. 748; bicupulatus, 71; bupleuroides, 177, 178, 180, 194; bupleuroides × pusillus, 194; capillaceus, 71, 192; × champlainii, 185, 186; Claytonii × Zizii, 188; clystocarpus, 71; coloratus, var. jamaicensis, 124; confervoides, 71; crispus, 58, 60–62, 64, 71, 72, 75, 76, 86–88, 91, 177; deminutus, 187; diversifolius, 71, 192; epihydrus, 71, 133; epihydrum × angustifolius, 188; epihydrus × nodosus, 186; epihydrus, var. Nuttalii, 138, 142; epihydrus, var. Nuttalii × pulcher, 184; Faxoni, 183, 185; × Faxoni, 183, 185; fibrillosus, 71; filiformis, 70; floridanus, 192; fluitans, 66, 90, 97, 100, 120, 124, 129, 130, 132, subsp. americanus, 124, subsp. americanus, proles novaeboracensis, 124; foliosus, 66, 71, var. macellus, 192; Friesii, 71; gemmiparus, 71; gramineus, 71, 73, 75, 97, 132, 142, 143, 145, 147, 150–152, 183, 184, 187, 189, 191, 195, pl. 746, var. graminifolius, 143, forma heterophyllus, 150, forma jemtlandicus, 148, var. lacustris, 144, var. longipedunculatus, 144, forma longipedunculatus, 144, var. maximus, 132, 143–146, 148, 151–153, 174, 196, pl. 748, var. minimus, 150, var. myriophyllus, 143, 145, 147, 150, 151, var. spathulaeformis, 151, 187, 189, forma terrestris, 144, var. **typicus, 143,** 149, 151, 196, pl. 748, forma Wolfgangii, 148; gramineus × illinoensis, 145, 149, 151, 158, 187, 190; gramineus × illinoensis × lucens, 187; gramineus × lucens, 158, 187; gramineus × natans, 186; gramineus × nodosus, 185; gramineus × per-

foliatus, 151; gramineus × perfoliatus, var. bupleuroides, 61, 183, 189; gramineus × Richardsonii, 152, 188, 191, 192; gramineus × Zizii, 187; gramineus × P. sp., 191; Hagströmii, 188, 189; heterophyllus, 132, 143, 148, 150, 157, forma graminifolius, 143, forma longipedunculatus, 143, forma maximus, 148, 187, forma minimus, 150, forma myriophyllus, 150, forma terrestris, 144; Hillii, 71; illinoensis, 71, 73, 75, 93, 94, 150, 152–154, 156–159, 185, 188, 191, 192, 195, pl. 746, forma homophyllus, 154, forma rosulatus, 154; illinoensis × lucens, 187; illinoensis × nodosus, 185, illinoensis × perfoliatus, 191; illinoensis × perfoliatus, var. bupleuroides, 191; illinoensis × Richardsonii, 191; illinoensis × P. sp., 192; insulanus, 124, 133; lateralis, 71; latifolius, 70; lonchites, 124, 125, 131, 132, 148, var. novaeboracensis, 124, 131; lonchites × rufescens, 185; longiligulatus, 71; lucens, 90, 92, 97, 154, 157, 158, var. connecticutensis, 154, 155, 158, var. floridanus, 154, 155, var. fluitans, 90, 97, 100, 120, 124; lucens × natans, 129; lucens × nodosus, 185; methyensis, 191; mexicanus, 124, 133; microstachys, 90, 94, var. subellipticus, 94, var. typicus, 92; montanense, 92, 93, 97; montanus, 124; mysticus, 194; × mysticus, 194, 196; natans, 60–63, 71, 74, 75, 102, 103, 120, 127, 134, 135, 138–140, 142, 192, 193, 195, 196, pls. 746, 747, var. fluitans, 124, var. prolixus, 135, 139, 140, forma submersus, 139, var. terrestris, 139, var. typicus, 139, var. vulgaris, 139; natans × gramineus, 186; natans × nodosus, 185; × nericius, 183; nitens, 188, 189; × nitens, var. subgramineus, f. restrictus, 189; nodosus, 59–62, 66, 71, 73, 75, 104, 123, 127, 131–134, 186, 195, 196, pls. 746, 748; nodosus × epihydrus, 125; nodosus × natans, 185; nodosus × Nuttallii, 186; nodosus × Richardsonii, 186; Nuttallii, 133, var. portoricensis, 124, 133; Oakesianus, 60–63, 71, 74, 75, 127, 140, 142, 193, 195, pl. 746; obrutus, 90, 93; obtusifolius, 71; occidentalis, 123, 134; panormitanus, 192; pectinatus, 71, 192; pennsylvanicus, var. portoricensis, 124; pensylvanicus, 133; perfoliatus, 58–61, 66, 71, 75, 76, 163, 174–178, 180, 181, 193, 194, var. bupleuroides, 171, 174, 175, 177, 178, 181, 182, 189, 190, 193–196, pls. 746, 748; perfoliatus, var. bupleuroides × Richardsonii, 193; perfoliatus, var. gracilis, 163, 177, 180, var. lanceolatus, 163, ssp. Richardsonii, 163, var. Richardsonii, 163, var. **typicus, 177,** 180, 181; × perplexus, 155, 157, 185; plantagineus, var. jamaicensis, 124, 134; polygonifolius, 58, 59, 71, 72, 75, 91, 98, 195, pl. 746; Porsildiorum, 71; Porteri, 71; praelongus, 58, 60, 61, 63, 71, 74, 75, 122, 159, 160, 162, 174–176, 195, pl. 746, forma elegans, 162; praelongus × Richardsonii, 193; Proteus heterophyllus, 143; Proteus lucens, 154; Proteus Zizii, 154, 187; × pseudolucens, 154, 187; × pseudo-Zizii, 187; pulcher, 59, 61, 62, 71, 73, 75, 103, 104, 119, 120, 122, 123, 127, 192, 195, pl. 746, forma amphibius, 121; Purshii, 140; pusillus, 71, 192, 194; × rectifolius, 183, 186; Richardsonii, 58–61, 71, 75, 76, 87, 149, 162, 163, 174–176, 191, 193, 195, pl. 746; Robbinsii, 71; rotundatus, 124, 131–133; rufescens, 90, 92, "forma angustifolia," 90; × scoliophyllus, 184, forma barensis, 184; × sparganifolius, 186; spathaeformis, 187; × spathaeformis, 187; spathulaeformis, 157, 187; spathuliformis, 187; × spathuliformis, 187; Spirillus, 71; strictifolius, 71; × subdentatus *α* sessilis, 191, *β* petiolatus, 188, 189, 191; × subnitens, 189, 190; × subobtusus, 183; × subrufus, 185, 186; × subsessilis, 186; tennesseensis, 71; tenuifolius, 90, 92, 97, var. subellipticus, 94, 97; Tepperi, 192; vaginatus, 71; varians, 187; Vaseyi, 71; Zizii, 97, 154, 158, 187, var. connecticutensis, 154, var. gracilis, 154, 187, var. methyensis, 191, var. porrectifolius, 154, 187; × Zizii, forma pulcherrimus, 187; zosteriformis, 71

Spirillus amplifolius, 100; heterophyllus, 144; lonchites, 124; lucens, 154; perfoliatus, 177, var. Richardsonii, 163; pulcher, 121; Zizii, 154, 187

Reprinted from Rhodora, Vol. 45, June–August, 1943

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY

CXLVIII

I. Five common Rhizomatous Species of Muhlenbergia 221
II. Notes on Danthonia 239
III. Erianthus brevibarbis and other Species 246
IV. Why not Andropogon Gerardi? 255
V. Studies in North American Species of Scirpus 279
VI. The Identity of Scleria setacea of Poiret 296
VII. What is Angelica triquinata? 298
VIII. Notes on Hieracium 317

By M. L. Fernald

Dates of Issue

Pages 221 to 258, plates 749 to 761 . . . . . 29 May, 1943
Pages 279 to 303, plates 762 to 769 . . . . . 6 July, 1943
Pages 317 to 325 . . . . . 10 August, 1943

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II. Notes on Danthonia 239
III. Erianthus brevibarbis and other Species 246
IV. Why not Andropogon Gerardi? 255
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VI. The Identity of Scleria setacea of Poiret 296
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M. L. Fernald

(Plates 749–769)[1]

During the studies necessary in a thorough revision of the flora of northeastern America and, especially, a checking with photographs of the types of Linnaeus, Michaux and other authors of American species much new matter has accumulated. Some of the studies, with photographs by Dr. Bernice G. Schubert, are here presented.

I. FIVE COMMON RHIZOMATOUS SPECIES OF MUHLENBERGIA

(Plates 749–757)

In eastern North America five species of *Muhlenbergia* stand out as the most common representatives of the rhizomatous members of the genus, the plants passing, mostly erroneously, as *M. mexicana* (L.) Trin., *M. sylvatica* Torr., *M. foliosa* (R. & S.) Trin. and the two very distinct species included under *M. racemosa* (Michx.) BSP. These five species have many technical differences (in glumes, lemmas, anthers, grains, internodes, nodes, sheaths, etc.) and habitally they are distinctive. The names currently applied to them, however, need most careful scrutiny for, when the types (all but one in Europe) are studied, it is apparent that those who have easily recognized the species involved have largely guessed at their names and, too often,

[1] The cost of engraver's blocks has been met in part from an appropriation for original research from the Department of Biology, Harvard University.

have not consulted the original descriptions. Sixteen years ago I undertook a clarification of our species, at that time securing from friends in London, Paris and Berlin photographs of many of the types involved; and in 1930, while in Europe, I checked many points not shown in habit-photographs.

As a result of this study it was evident that we must adopt many unfamiliar names or change the significance of those now familiar but, disliking the upheaval necessitated, I have refrained from publication, with the hope that specialists on the *Gramineae* would take the responsibility of correcting the many errors. Having now reached a stage in my work when the facts can no longer be dodged, I am presenting in key-form the diagnostic characters of the five species. This will be followed by consideration of the names now in use and those which, it seems to me, must be taken up. In some instances, however, inability at present to consult many critical specimens abroad may result in slight future changes. In his Manual Hitchcock[1] adopts for

[1] I am credibly informed that Hitchcock strenuously and rightly objected to these absurd names, which were forced into his book through the ruling of his Chief (see Hitchcock, Man. 14), an illustration of the type of intellectual freedom allowed scholarly and original workers in some branches of our "free and democratic" government. In view of the fact that true and heretofore misinterpreted *Muhlenbergia racemosa*, as stated on one of the labels before me, "Grows in the dryest of soil" one wonders how long the inspired name "Marsh Muhly" will be the "standard" name for it. Its originator obviously intended the name for *M. setosa*, a wholly distinct species of bog, swale, peaty meadows and wet shores. Incidentally, the emended name as "Muley" would be wholly inappropriate for either *M. racemosa* or *M. setosa*, species which differ from the others by the very prolonged awns of their glumes; muley, as every farmer-boy knows, implies lack of horns. The prolific inventor of "English" names flatly discriminated against *M. sylvatica*, *M. "foliosa"* and many others, allowing them no "English" names, althogh they are thoroughly distinct and abundant species. This was perhaps fortunate, for the binomials generally applied to them are so liable to upset when studied by scientists. If the time used in inventing "English" names for these plants had gone into study of their proper typification some of the upsets in the following pages might be unnecessary. *"C'est à rire!"*

À propos the reference to dictatorship by some in power over young (sometimes older) scientists, I have recently received copies of correspondence from a botanist formerly in government employ, in which the inventor of "English" names ruled that the young man should not publish a new plant in RHODORA because the type is not in the National Herbarium and because the author had followed the International Rules of Plant Nomenclature, though in this case the dictator was overruled by still higher officials. Probably no more severe blight upon scholarly development of taxonomy under federal dictatorship has existed. The inventor of "English" names himself once made a weak effort in taxonomy. That he did not "arrive" is clear from his greatest monograph, with its delightfully naïve key:

Leaves obovate, etc. . . . . .
Leaves not with all the characters given above, etc.
Leaves not exceeding 2 cm. in length, etc.
. . . . . .
. . . . . .

members of *Muhlenbergia* the stupid "English" name "Muhly" ("Marsh Muhly", "Wire-stem Muhly", etc.). There would be some propriety in dropping the *h* and then applying the word as an adjective to the current nomenclature of the misinterpreted five. In tabulating the characters I am numbering the species, the name in current use being bracketed. Beautifully clear illustrations of four of the plants will be found in Hitchcock's Manual, figs. 768, 770, 774 and 776. I am greatly indebted to Mr. Jason Swallen for an opportunity to study fragments of the types of *Agrostis mexicana* L. and of *A. foliosa* R. & S. Photographs made from them will be found in PLATES 749, FIGS. 1–3 and 751, FIG. 2).

a. Rhizomes and stolons 2–6 mm. thick, with cucullate-arching ovate scales; nodes of culm thick and abruptly enlarged; panicles usually arching, their branches evident; glumes shorter than to about equaling lemma, the longer 2–3.5 mm. long; base of lemma with straight and rather stiff beard; anthers 0.3–0.6 mm. long . . . *b.*

b. Culms loosely ascending to geniculate and rooting at lower nodes, freely branching from basal and middle nodes, the branches soon forking, the plants thus becoming bushy in habit and topheavy, the promptly uncovered internodes lustrous and glabrous; leaf-sheaths loose, laterally compressed, promptly opening to base; terminal panicle exserted, or with included base, at first lax and open, lanceolate to slenderly pyramidal or ellipsoid, later with appressed branches; lateral panicles in axils of many leaves, partly included; many spikelets slender-pedicelled; glumes very unequal, both awned, membranaceous, green or purplish; lemma membranous; grain easily loosened, linear-cylindric, 1.6–2 mm. long . . . . . 1. [*M. mexicana*].

b. Culms erect or ascending, lower nodes not rooting, unbranched or with erect or ascending mostly simple branches from middle nodes, internodes largely covered by sheaths, opaque and puberulent; leaf-sheaths tight, terete, tardily opening to base; panicles all or nearly all terminating culms and erect branches, mostly exserted, linear- to oblong-cylindric; glumes subulate-tipped (if rarely awned, subequal).

Erect, with few simple appressed-ascending branches; leaf-blades ascending or slightly spreading, firm; panicles rather stiff, the subsessile to short-pedicelled spikelets densely imbricated and extending to bases of the glomerulate appressed-ascending branches and branchlets; glumes subequal, firm and herbaceous, usually green or

---

Leaves not with all the characters given above.

Leaves orbicular to oval, etc.

Leaves or other parts not as described above.

and so on, including the informative calls in the key "Leaves not as described". It is no wonder that one who got little deeper than that into an exacting field did not fully understand its importance.

purplish; lemma firm, usually awnless (rarely awned); mature florets persistent; grain slenderly ellipsoid, 1.3–1.6 mm. long, tightly embraced by lemma and palea. 2. [*M. foliosa*].

Ascending to erect, with many ascending simple or forking branches from middle nodes; leaf-blades spreading, rather soft and pliant; panicles slender, loosely flowered, flexuous, the longer branches mostly without crowded basal spikelets, the spikelets often long-pedicelled; glumes very unequal, scarious or hyaline, usually whitish or silvery; lemma scarious, silvery, often long-awned; mature florets promptly dropping; grain linear-cylindric, 1.4–2.1 mm. long, easily removed.....3. [*M. sylvatica*].

a. Rhizomes and stolons slender (2–4 mm. thick), greatly prolonged and forking, with appressed lanceolate to narrowly oblong prolonged scales; nodes of culm gradually enlarged upward; panicles all at tips of culms or branches, stiff, lobulate-spiciform (especially at summit) the stiff branches densely flowered to base; glumes much exceeding lemma, subequal, linear-attenuate and long-awned, 4.5–8 mm. long; lemma slenderly villous at base; anthers 0.5–1.5 mm. long; ripe florets tardily dropping.

Culms mostly branching from middle nodes, the leaves and branches there approximate, the internodes lustrous and glabrous; leaf-sheath acutely keeled, the prolonged ligule 3–5 mm. long; anthers 0.5–0.8 mm. long; grain tightly embraced, linear-cylindric, 1.8–2.2 mm. long; species of dry prairie, rocks and bluffs from Wisconsin to Saskatchewan, and west to Oregon, south to Illinois, Missouri, Kansas and New Mexico; casual along railroads eastward 4. [*M. racemosa*].

Culms simple or with few erect basal branches; the internodes opaque and puberulent; leaf-sheath with rounded midrib, scarcely keeled, the inconspicuous ligule 0.5–1.5 mm. long; anthers 1–1.5 mm. long; grain easily freed, oblong-cylindric, 1.2–1.5 mm. long; species of bogs, wet meadows, wet rocks and shores, from Newfoundland to Alberta, south to North Carolina, Indiana, Wisconsin, Minnesota, Wyoming, Nevada and Oregon.....5. [*M. racemosa*].

True M. mexicana (Plates 751 and 752)

Muhlenbergia mexicana (L.) Trin. Gram. Unifl. 189 (1824) rests upon *Agrostis mexicana* L. Mant. i. 31 (1767). *Agrostis mexicana* was raised by Linnaeus in the garden at Upsala from seeds sent him from Vienna by Jacquin and erroneously thought to have come from tropical America. By most recent authors it is considered to be species no. 1 of the preceding key: "the plants becoming topheavy and bushy", to use Hitchcock's phrase, with abundant decumbent and rooting or ascending often forking lustrous branches; the sheaths compressed and loose, promptly opening to the base; the branches bearing numerous partly included axillary panicles; the terminal panicles relatively

soft and loose upon expanding, many of the spikelets long-pedicelled; the glumes very unequal and both awned; the easily removed grain linear-cylindric, etc. How different was the unusually full description by Linneaus of his *Agrostis mexicana:*

mexicana. 20. AGROSTIS panicula oblonga congesta, calycibus [glumis] corollisque [lemmatibusque] acuminatis subaequalibus muticis. *Habitat in* America *calidiore. D. Jacquin* . ♂
Culmi *numerosi, pedales, laeues, erecti.* Ramis *indiuisis.* Folia *laeuiuscula ligula truncata.* Panicula *viridis, oblonga, non patens, sed congesta coaceruatis numerosissimis viridibus floribus.* Flores *scabri.* Calyces *apice subulati, subaequales, parum scabri.* Corollae *longitudine calycis, apice similiter acuminatae, basi pilosae.* Aristae *nullae.* Stigmata *atropurpurea, ramosa.* Stamina *alba. Difficillime hoc Gramen determinatur. Altero anno floret. Facies Cinnae.* H. U.

Passing for the moment the "*panicula oblonga congesta*" or "*congesta coaceruatis*", it should be clear that the "culmi . . . *erecti*" the "Ramis *indiuisis*" and the "Calyces [glumae] *apice subulati, subaequales*" do not belong to species no. 1, which has often decumbent or lopping culms with mostly forking and very abundant basal and median branches, the glumes very unequal and both slenderly awned. The "Aristae *nullae*" could belong to no. 1 or to no. 2. Linnaeus said nothing about the very numerous axillary panicles partly included in the subinflated sheaths of the branches which so generally characterize no. 1. His unusually full description is clearly not a good one for no. 1 and, in view of the almost universal recent error of so identifying it, the original comment of Linnaeus still has force: "*Difficillime hoc Gramen determinatur*". Linnaeus had two sheets of the type material, both clearly marked by him *Agrostis mexicana.* Beautiful photographs of the two sheets, sent to the Gray Herbarium in 1927 by the late Dr. B. Daydon Jackson, are before me. One is of a badly crumpled specimen, the other (our PLATE 751, FIG. 1) better prepared. They both show erect culms, with few simple erect branches, tight sheaths, terminal panicles, no definitely included axillary panicles, subequal awnless glumes (PLATE 751, FIG. 3) and awnless lemmas; and the broken-off culms are 5 dm. (20 inches) high. Linnaeus's "culmi . . . *pedales*" was too conservative. PLATE 752, FIG. 2 is from a portion of the panicle of the type, now preserved at the United States National Herbar-

ium and most generously sent me for study by Mr. Swallen. The type specimens of *Agrostis mexicana* are of species no. 2, the plant passing as *Muhlenbergia foliosa.*

As he stated, Linnaeus received his seed from Jacquin and raised the plant at Upsala. Jacquin's plant at Vienna was clearly described, and illustrated by a life-size colored plate, by the younger Jacquin in his Eclogae Plantarum Rariorum—Gram. Fasc. ter. et quart., 44, t. 30 (1813). Jacquin filius departed little from Linnaeus, his fuller account including "CULMI . . . bipedales, . . . erecti, . . . teretes . . . ; ramis axillaribus, erectis, distichis, adpressis . . . vaginis . . . apertis . . . FLORES in paniculis terminalibus culmi primarii et ramorum, ante et post anthesin coarctatis, . . . ; ramis ramulisque . . . erectis adpressis . . . Calyx . . . Glumae subaequales, lanceolatae, acuminatae"; and his wonderful plate (our PLATE 752) showed a characteristic plant of our species no. 2, even to the slenderly ellipsoid grain. The material cultivated by the Jacquins at Vienna was, then, like that sent to and cultivated by Linnaeus at Upsala and described by him as *Agrostis mexicana.* When he transferred *A. mexicana* to *Muhlenbergia,* Trinius, Gram. Unifl. 189 (1824) held the diagnostic characters of the Linnean species "Panicula contracta densiuscula; Glumis lineari-lanceolatis acutissimis subaequalibus perianthio acutissimo vix brevioribus". There seems to be no way to avoid taking up for the plant erroneously passing as *M. foliosa* the clearly described and typified M. MEXICANA (L.) Trin.

M. MEXICANA OF RECENT AUTHORS (PLATES 749 and 750)

When we consider the earlier available names for the plant recently but erroneously passing as *Muhlenbergia mexicana,* our species no. 1, the name seemingly available, if we accept current bibliographies, is *M. lateriflora* (Michx.) Trin. ex Kunth, Enum. i. 207 (1833) in synonymy of *Cinna lateriflora* Kunth, Rev. Gram. i. 67 (1829), both names based on *Agrostis lateriflora* Michx. Fl. Bor.-Am. i. 53 (1803) from rock-cliffs of the Mississippi and shores in [southern] Illinois. Michaux's description is not at all good for a plant with geniculate and bushy-branched stems, relatively large terminal panicles and long-awned glumes;

and the photograph of the type sent me by M. Cintract is very inconclusive. The description was as follows:

LATERIFLORA. A. culmis erectis, nodosis: foliis linearibus, planis: paniculis lateralibus et terminalibus, pusillis, coarctatis, densifloris: glumae muticae et scaberulae valvis acutissimis; interioribus majoribus, basi barbulatis.
Hab. praesertim in praecipitibus saxosis fluminis *Missisipi* et ripariis Illinoensibus.

Authors immediately following Michaux seem not to have known the plant, Beauvois shifting it without discussion to *Vilfa*, and Kunth, likewise with no discussion, transferring it to *Cinna*. It was not until Kunth's Enumeratio that the plant, as *Cinna lateriflora* (Michx.) Kunth, with "Muehlenbergia lateriflora *Trin.*" as a synonym, was again accorded a diagnosis, that copied directly from Michaux. Michaux's erect culm, densely flowered small panicles and muticous glumes are not satisfactory for the common plant known as *M. mexicana*. The photograph is of mere fragments: broken-off tips of a stiffly ascending plant with long internodes; leaf-blades erect, only 2–4 mm. broad and long-tapering; the linear-filiform panicles only 1.5–4 mm. thick, with spikelets only 2.5–3 mm. long. These fragments look like small bits picked from a plant of *M. glabriflora* Scribn. Only Michaux's "glumae . . . interioribus . . . basi barbulatis" would seem to separate it from that species of dry or baked soils, gravels or rocky slopes, from southwestern Indiana (perhaps also Ohio) and Illinois to Texas. *M. glabriflora* is reputed to have the lemma glabrous. It would not now be justifiable to reduce *M. glabriflora* to *M. lateriflora;* when the florets can be actually studied that may be inevitable. In fact, Steudel, Synop. Pl. Gram. 182 (1854), describing in detail the species he took to be *Cinna lateriflora* (Michx.) Kunth, from Ohio plants of Frank's, said "glumis . . . subaequalibus . . . ; valvulis . . . glabris." It is, however, fairly clear that we can not properly take up *M. lateriflora* for the plant, no. 1, which has been passing as *M. mexicana*.

Another name, ignored or waved aside by recent American authors, needs consideration, for it is with little doubt the first name for species no. 1, the plant generally passing as *Muhlenbergia mexicana* and so passing for more than a century, the confusion dating back to botanists of a full century ago, when

nos. 1 and 2 were completely mixed in our floras, Torrey, Fl. N. Y. ii. 437, 438 (1843), for instance, saying "*M. foliosa* Trin. (*Agrostis filiformis*, Muhl. gram.) seems to be only a variety of this species", in which, unintentionally perhaps, he was correct, for, as I later show, the type of *Agrostis filiformis* is the form of true *M. mexicana* with awned lemmas. The species (*M. mexicana* sensu Torrey) with "Culm . . . much branched . . . often geniculate; sheaths compressed, loose . . . is sometimes troublesome in gardens", the latter points applying to species no. 1. The neglected name to which I refer is *Agrostis frondosa* Poir. in Lam. Encyc. Suppl. i. 252 (1790). The description, noting *flexuous stems, very leafy and compressed branches*, purplish nodes, *loose sheaths* and oblong and often purplish panicles suggesting those of *A. mexicana*, are all indicative of species no. 1. Here is Poiret's account, he giving the name because of the leafiness of the plant:

> 46. AGROSTIS feuillé *Agrostis frondosa.*
>
> *Agrostis culmo flexuoso, articulis ramosis, foliosis; paniculis coarctatis; calicibus acutis, corollâ brevioribus.* (N.)
>
> Ses tiges sont hautes d'un à deux pieds, glabres, un peu flexueuses à leurs articulations: de chacune de ces articulations il sort des rameaux feuillés, comprimés, également flexueux, & souvent de couleur purpurine au dessous des noeuds. Les feuilles sont glabres, courtes, nombreuses; leur gaîne lâche, nue à son orifice, munie d'une petite membrane blanche. Les panicules sont étroites, serrées, assez semblables à celles de l'*agrostis mexicana;* les ramifications en forme d'épis oblongs, de couleur verte, un peu purpurine; les fleurs petites, oblongues; les valves calicinales plus courtes que celles de la corolle, aiguës, mucronées à leur sommet; celles de la corolle étroites, oblongues, aiguës.
>
> Cette plante croît en Allemagne. (*V. s. in herb. Desfont.*)

Although it was supposed that *Agrostis frondosa* came from Germany, the name was completely disregarded in the great German floras of Gmelin, Koch and others of their period; nor does it have any recognition in the more modern and voluminous treatments by Ascherson & Graebner and by Hegi. The source, like that of so many species early reaching European collections, was evidently misunderstood, as was that of *A. mexicana* of Linnaeus, Jacquin and others. Nevertheless, the weedy tendency of species no. 1 evidently enabled it to reach Europe somewhat after Poiret's time. For instance, Lejeune & Courtois, Comp. Fl. Belg. i. 61 (1828) refer to *A. "mexicana"* having been collected in Belgium, "e semine exotico orta"; and Hegi, Ill. Fl.

Mittel-Eur. vii. 154 (1931), refers to the recent occurrence in Germany of *M.* "*mexicana.*" Whether these are true *M. mexicana* ("*foliosa*") or the very different plant (our no. 1) which generally passes as *M. mexicana* I can not now determine.

But, returning to *Agrostis frondosa* Poir. Roemer & Schultes, Syst. ii. 373 (1817) made it an exact synonym of their newly defined *A. foliosa,* saying "certissime huc spectat". Steudel, who certainly understood grasses, treated it unequivocally in his Nomenclator, ed. 2: 365 (1840) as identical with various plants now placed under *Muhlenbergia* (including *M. foliosa,* etc., but not *M. mexicana,* which Steudel retained in the true sense). Hooker filius & Jackson in Index Kewensis, placed it, also without question, in the all-inclusive *M. mexicana* of their period. As already noted, Poiret's "culmo flexuoso . . . de chacune de ces articulations il sort des rameux feuillés, comprimés, également flexueux . . . Les feuilles . . . nombreuses; leur gaîne lâche, . . . Les panicules . . . les ramifications en forme d'épis oblongs" are reasonably good characterizations of our common so-called *M. mexicana;* no other species involved in the problem has *lax* and *compressed* sheaths. I am, therefore, subject to verification when the type can be studied, identifying *M. mexicana* of recent authors with AGROSTIS FRONDOSA Poiret.

The name *Muhlenbergia foliosa* (Roemer & Schultes) Trin. Gram. Unifl. 196 (1824) rests for typification upon *Agrostis foliosa* Roem. & Schultes, Syst. Veg. ii. 373 (1817). As currently treated *M. foliosa* is an erect plant with few erect branches; scabrous-puberulent internodes; firm ascending leaves; "panicles mostly exserted, often rather long-exserted, narrow, of numerous short appressed densely flowered somewhat aggregate branches" (*Hitchcock*), the branches densely flowered to base; the spikelets subsessile or short-pedicelled; glumes subequal and subulate-tipped (only rarely definitely awned), firm and herbaceous; the usually awnless lemma of similar texture; the mature florets tardily dropping and tightly embracing the slenderly ellipsoid grain (1.3–1.6 mm. long), the plant, my no. 2, which I identify with *M. mexicana* in the strict sense. Roemer & Schultes evidently supposed that Poiret's *Agrostis frondosa* was the plant in cultivation under the equivalent name, *A. foliosa,* and their glumes unequal, with hispid awns ("calycibus inaequalibus aris-

tatis hispidis") might well have been derived from *A. frondosa;* but their lemma and palea unequal, the former awned at tip and the culm much branched, erect ("corollis . . . inaequalibus valvulâ majore apice aristata, culmo ramosissimo erecto") suggest *M. sylvatica!* Roemer & Schultes had two varieties: "α. paniculis viridibus" to which they assigned *A. filiformis* Willd.; and "β. paniculis rubicundis" to which they assigned *A. frondosa* Poir. The latter has already been discussed.

The two subdivisions of their *Agrostis foliosa* were borrowed in part from Willdenow, who had described, also from cultivated plants, *A. filiformis* Willd. Hort. Bot. Berol. i. 95 (1809); but without including in it *A. frondosa* Poir.

*6. AGROSTIS *filiformis*.

A. panicula coarctata subspicata, calycibus aristatis inaequalibus hispidis, corollis calyce majoribus inaequalibus valvula majore apice aristata, culmo ramosissimo erecto.

α. paniculis viridibus.

β. paniculis rubicundis.

Agrostis foliosa *Hortulanorum*.

Habitat in America *boreali*. ♃. D.

A Polypogone diversa calycibus corolla brevioribus. Habitu accedit ad A. mexicanam, sed calycibus, corollis, inflorescentia tenuiore, et florescentia serotina diversa. Varietas β robustior.

A photograph of Willdenow's type of *Agrostis filiformis*, most kindly presented to me by Professor Diels, shows the slenderest extreme of *Muhlenbergia mexicana*, the plant usually passing as *A. foliosa;* but the awns at the tips of the lemmas show that it is the form known as *A. foliosa*, forma *ambigua* (Torr.) Wieg. The exact identity of the plants of Roemer & Schultes must await opportunity to study them. In the mean time, however, the very liberal fragments of what was taken as the type of Roemer & Schultes have been sent me from the National Herbarium at Washington for study. Portions of this material are reproduced as PLATE 749, FIGS. 1, 2 and 3. They certainly belong to the species which has erroneously passed as *M. mexicana;* and since the name *Agrostis foliosa* Roemer & Schultes was nomenclaturally a substitute for *A. frondosa* Poir. and, therefore, illegitimate, it is fortunate that the Roemer & Schultes type belongs so unequivocally to the species which I take to be *A. frondosa* of Poiret.

M. sylvatica

Muhlenbergia sylvatica Torr. is, apparently, correctly understood! A northeastern variety of it will be published on a succeeding page.

M. racemosa (Plates 753 and 754)

Muhlenbergia racemosa (Michx.) BSP., on the other hand, has been quite misinterpreted. This misinterpretation arose through the fact that most specimens reaching the European herbaria and the plant best known to botanists of Cambridge, New York and Washington is the very different *M. setosa* (Spreng.) Trin., with erect, slender and usually simple culms with scabrous-puberulent internodes, typical of bogs, wet meadows and shores and doubtless suggesting to the manufacturer of "English" names the pseudonym "Marsh Muhly", commented upon on p. 222. *Agrostis racemosa* Michx., basis of the very recent and by its authors not understood combination *M. racemosa* (Michx.) BSP. Prelim. Cat. N. Y. 67 (1888), "Presumably based on *Agrostis racemosa* Michx." (*Hitchcock*), is a wholly different species of the interior of the continent and almost unknown in herbaria prior to 1850. It was finally recognized as *M. glomerata*, var. *ramosa* Vasey, Descr. Cat. Grasses U. S. 40 (1886) but Vasey did not see the really distinctive characters.

Muhlenbergia setosa (or *glomerata*) has the culms unbranched or with few erect basal branches; opaque and scabrous-puberulent internodes; leaf-sheath with rounded midrib and minute usually hidden ligule; conspicuous anthers 1–1.5 mm. long; oblong-cylindric grain easily freed and 1.2–1.5 mm. long; the species with transcontinental boreal range and intrusions southward, east and west, in paludal habitats. *M. racemosa*, on the other hand, is a plant of the dry interior, often "in the dryest of soil", with culms usually stiffly branched at the middle nodes; the internodes lustrous and glabrous; the leaf-sheath keeled; the ligule prolonged; the anthers only 0.5–0.8 mm. long; the tightly embraced linear-cylindric grain 1.8–2.2 mm. long.

Michaux's original description was too general to note any of the specific points, and his habitat, "in ripis sabulosis inundatis fluminis *Missisipi*" inconclusive. The photograph of the type before me shows, however, the high-branching culm and the

characteristic stiffly glomerulate-spiciform panicles of *M. glomerata*, var. *ramosa;* and examination by me of the Michaux specimens in 1930 revealed the glabrous internodes and tiny anthers. The name *Muhlenbergia racemosa* (Michx.) BSP. should be restricted to the plant of the interior later described as *M. glomerata*, var. *ramosa*.

M. SETOSA (PLATES 755–757)

Muhlenbergia glomerata (Willd.) Trin. Gram. Unifl. 191, pl. 5, fig. 10 (1824) rests upon *Polypogon glomeratus* Willd. Enum. Pl. 87 (1809), which was described in great detail, the simple diagnosis and accompanying statements being

> *2. POLYPOGON *glomeratus*.
> P. panicula glomerata subspicata, calycibus subulatis scabris, culmo adscendente basi ramoso.
> Agrostis festucoides *Mühlenberg in litt.*
> *Habitat in* America *boreali* ♃. D.

Since the plant was received from Muhlenberg, it presumably came from eastern Pennsylvania. The very long description following the diagnosis may be abbreviated.

> "*Folia* rigidiuscula . . . *Ligula* brevissima . . . *Vaginae* foliorum solutae. *Panicula* glomerato-spicata obtusiuscula, ramis brevissimis adpressis flexuosis . . . *Calyx* . . . aristatus corolla longior, nervo medio viridi, una cum arista scabro . . . Basis corollae pilis aliquot est instructa . . . Habitu accedit quodammodo ad Agrostidem mexicanam, sed recedit ab hoc genere calyce aristato, et est vera Polypogonis species."

The type, for a photograph (our PLATE 756, FIG. 1) of which I am indebted to Professor Diels, consists of four plants of the characteristic species (MAP 1) growing in bogs and wet meadows from western Nova Scotia and southern Maine to southern Ontario and Michigan, south to southern New England, northern New Jersey, Pennsylvania, mountains to North Carolina, and Indiana. There is no question about the identity of *Muhlenbergia glomerata;* but a second plant (MAP 2), also of simple habit or branched usually from the base, with puberulent internodes, large anthers and short grains, occurs farther north, from Newfoundland to Alberta, south to Nova Scotia and Maine, northern Massachusetts, Connecticut, New York, central Pennsylvania, Ohio, Michigan, Wisconsin, Minnesota, Wyoming, Nevada and Oregon. This is *Dactylogramma cinnoides* Link, Hort. Berol. ii.

MAP 1 (upper), eastern Range of MUHLENBERGIA SETOSA; MAP 2 (lower), of M. SETOSA, var. CINNOIDES.

248 (1833), described in great detail from plants raised from seed from northwestern Canada sent by Dr. John Richardson. The genus *Dactylogramma* Link was based on this material, Link separating it from *Cinna*. From the very full description the following points are drawn:

"Caulis erectus parum ramosus . . . Panicula tenuis glomerata. Valvae subaequales longissime acutatae quasi aristatae, glumella longiores. Valvulae . . . pilis longis adpressis ad marginem . . . Caulis sub terra repens, 2–3 pedes altus . . . inferne pilis brevissimis pubescens . . . ligula brevis truncata. Panicula 2–4 poll. longa, ramis subdistantibus brevissimis superne approximatis, ramulis conglomeratis."

The description is vivid; the photograph (our PLATE 757, FIG. 1) of Link's type sent me by Professor Diels unequivocal.

The more northern *Dactylogramma cinnoides* differs in several characters from the relatively southern *Muhlenbergia glomerata*. In the latter the flowering culms bear 7–15 leaves, many of them often crowded and overlapping at the middle nodes; in the former there are 5–8 (rarely –10) more scattered leaves. In *M. glomerata* the panicle, as correctly defined by Willdenow, has round-tipped spikes mostly crowded to form a subcontinuous lobulate-spiciform inflorescence; in *D. cinnoides* the spikes or branches, except the upper, are more scattered or subdistant and less rounded at summit. In *M. glomerata* the inflorescence is often purplish, sometimes green; in *D. cinnoides* green, though sometimes purplish. The panicle of *M. glomerata* has a misty appearance, the awns and glumes not sharply visible. This comes from the copiously hispid keels and awns. In *D. cinnoides* the panicle has the glumes and awns more clearly visible, the keels and awns being merely scabrous with definitely shorter trichomes. These differences, with no appreciable difference in anthers and grains, seem to me varietal, rather than specific, and I am treating *D. cinnoides* as a northern geographic variety of the more southern plant.

Unfortunately, however, there is an earlier valid specific name for true *Muhlenbergia glomerata* (Willd.) Trin., which was based on *Polypogon glomeratus* Willd. (1809). This is *Polypogon setosus* Spreng. Mant. Fl. Hal. 31 (1807). That it is specifically identical with the Muhlenberg material which formed the basis of Willdenow's species is clear from the description; the photo-

graph of Sprengel's type (our PLATE 755, FIG. 1), for which I am also indebted to Professor Diels, is certainly of the plant of eastern Pennsylvania. Sprengel's description was to the point:

> 9. POLYPOGON SETOSUS, panicula spicaeformi, glumis acuminatis aristatis scabris, foliis involutis rigidis.
>
> *Culmus* teres, glaber, foliosus, pedalis. *Folia* glabra, vaginantia, involuta, rigida. *Panicula* terminalis, parumper ex ultimo folio emergens, fusca, densè spicaeformis, ramulis glomeratis contractis. *Gluma* calycina valvulis acuminatis scabris aristatis, uniflora, corolla paullo maior. *Gluma* corallina valvulis acuminatis muticis.
>
> E Pensylvania. *Muhlenb.*

In his De Graminibus Unifloris et Sesquifloris, 195 (1824), after properly transferring several species to *Muhlenbergia*, Trinius took a short cut and merely stated that certain species belonged to that genus: "Ad sectionem *a* (*Mühlenbergiam*) pertinent: . . . Polypogon setosus *Spreng.*", but the combination, ascribed to Trinius at this place and with the correct synonym, *M. glomerata*, was made in Index Kewensis. The species with culms simple or sparingly branched at base and with scabrous-puberulent internodes, large anthers and small grains is, then, M. SETOSA (Spreng.) Trin. ex Hook. f. & Jackson, Ind. Kew. ii. 209 (1894).

Summarizing this rather verbose but seemingly necessary discussion, the five species of *Muhlenbergia* specially considered resolve themselves as follows (omitting *M. sylvatica* which, except for the designation of a variety, is unchanged). In order to clarify the complex questions I am reproducing photographs of types in so far as they are before me and sufficiently clear for reproduction. These I am supplementing by some of Dr. Bernice G. Schubert's very clear enlargements of pertinent details.

MUHLENBERGIA **frondosa** (Poir.), comb. nov. *Agrostis frondosa* Poir. in Lam. Encyc. Suppl. i. 252 (1790). *A. foliosa* Roem. & Schultes, Syst. ii. 373 (1817), substitute-name for *A. frondosa*. *M. foliosa* (Roem. & Schultes) Trin. Gram. Unifl. 196 (1824), not recent auth. *M. mexicana* sensu most recent auth., not (L.) Trin.—For diagnostic characters see no. 1 in key. PLATES 749 and 750.

M. FRONDOSA, forma **commutata** (Scribn.), comb. nov. *M. mexicana commutata* (as subsp.) Scribn. in RHODORA, ix. 18 (1907), at least as to TYPE, *Fernald*, no. 522, designated by Hitchc. Man. 890 (1935), where Scribner's trinomial "n. subsp." is cited as "var." *M. mexicana*, var. *commutata* (Scribn.) Farwell in Rep. Mich. Acad. Sci. xvii. 181 (1916). *M. commutata*

(Scribn.) Bush in Am. Midl. Nat. vi. 61 (1919). *M. mexicana*, forma *commutata* (Scribn.) Wiegand in RHODORA, XXVI. 1 (1924).

M. MEXICANA (L.) Trin. Gram. Unifl. 189 (1824). *Agrostis mexicana* L. Mant. i. 31 (1767); Jacq. f. Eclog. Pl. Rar.-Gram. Fasc. ter. et quart. 44, t. 30 (1813). For other synonyms based on *A. mexicana* see Hitchcock. *M. foliosa* sensu most recent auth., not (R. & S.) Trin. For diagnostic characters see no. 2 in key. PLATES 751 and 752.

M. MEXICANA forma **ambigua** (Torr.), comb. nov. *Agrostis filiformis* Willd. Enum. i. 95 (1809). *Cinna filiformis* (Willd.) Link, Enum. i. 70 (1821). *Agrostis lateriflora*, var. *filiformis* (Willd.) Torr. Fl. N. Mid. U. S. 86 (1823). *M. ambigua* Torr. in Nicollet, Rep. Miss. 164 (1843). *M. mexicana filiformis* (Willd.) Scribn. in Mem. Torr. Bot. Cl. v. 36 (1894). *M. foliosa ambigua* (Torr.) Scribn. in RHODORA ix. 20 (1907). *M. ambigua*, var. *filiformis* (Willd.) Farwell in Mich. Acad. Sci. Rep. xx. 168 (1919). *M. foliosa*, forma *ambigua* (Torr.) Wiegand in RHODORA, XXVI. 1 (1924).

M. MEXICANA, forma **setiglumis** (S. Wats.), comb. nov. *M. sylvatica*, var. *setiglumis* S. Wats. in King, Geol. Expl. 40th Paral. v. 378 (1871). *M. foliosa setiglumis* (S. Wats.) Scribn. in RHODORA, IX. 20 (1907). *M. setiglumis* (S. Wats.) Nels. & Macbr. in Bot. Gaz. lxi. 30 (1916).

M. SYLVATICA Torr., var. **robusta,** var. nov., culmis rigidis arcte adscendentibus; foliis firmis ad 5–9 mm. latis; paniculis densioribus; glumis late lanceolatis vel lanceolato-ovatis; lemmatibus 3–4 mm. longis longe aristatis; antheris 0.5–0.7 mm. longis; caryopsibus 1.9–2.1 mm. longis.—Open woods and thickets, central Maine to western New York and eastern Pennsylvania. The following are characteristic. MAINE: Austin Stream, Moscow, August 27, 1902, *Collins & Chamberlain;* Sydney, August 18, 1916, *Fernald & Long*, no. 12,597 (TYPE in Herb. Gray). NEW HAMPSHIRE: by Merrimac River below Bedford, August 27, 1931, *Fernald & Griscom*, no. 2495; Gilsum, August 9, 1899, *Fernald*, no. 287; Wilton, August 15, 1916, *C. F. Batchelder*. VERMONT: Grand Isle, July 24, 1935, *Knowlton*. MASSACHUSETTS: Needham, August 31, 1884, *T. O. Fuller;* Blue Hills Reservation, September 22, 1895, *E. F. Williams;* Huntington, August 17, 1912, *Robinson*, no. 358. RHODE ISLAND: Lincoln, October 2, 1910, *E. F. Williams*. CONNECTICUT: Sprague, September 1, 1905, *Woodward;* Reynold's Bridge, September 4, 1910, *Blewitt;* Bridgeport, September 22, 1896, *Eames*. NEW YORK: Starbuckville, August 26, 1932, *Muenscher & Lindsey*, no. 2954; Genoa, August 21, 1918, *Wiegand*, no. 9185; Ithaca, September 5, 1916, *F. P. Metcalf*, no. 5613; Butler, October 5, 1916, *Metcalf & Wright*, no. 5614. PENNSYLVANIA: Wayne, October 15, 1910, *Bartram*, no. 1313.

Typical *Muhlenbergia sylvatica* has relatively weak and loosely ascending culms; the leaves subflaccid, the larger ones 2–7 mm. wide; the panicle very loose; the glumes linear-lanceolate to linear-attenuate, the 2d about equaling to slightly exceeding the blade of the lemma, the latter 2.3–3 mm. long; the anthers 0.3–0.6 mm. long; the mature grain nearly or quite free, 1.4–1.8 mm. long. It is widely distributed, from southwestern Quebec to Minnesota, south to North Carolina, Alabama, Arkansas and northeastern Texas.

Var. *robusta* is stiffer and larger in all parts. Its leaves are firm and more ascending, the larger ones 5–9 mm. broad; the panicle fuller; glumes broadly lanceolate to lance-ovate, shorter than the blade of the lemma, the latter 3–4 mm. long; anthers 0.5–0.7 mm. long; grain more firmly embraced and 1.9–2.1 mm. long.

M. RACEMOSA (Michx.) BSP. Prelim. Cat. N. Y. 67 (1888), by inference. *Agrostis racemosa* Michx. Fl. Bor.-Am. i. 53 (1803). *Polypogon racemosus* (Michx.) Nutt. Gen. i. 51 (1818). *Cinna racemosa* (Michx.) Kunth, Rév. Gram. i. 67 (1829). *M. glomerata*, var. *ramosa* Vasey, Descr. Cat. Grasses U. S. 40 (1885). *M. racemosa*, var. *ramosa* Vasey in Beal, Grasses N. Am. ii. 253 (1896). For diagnostic characters see no. 4 in key. PLATES 753 and 754.

M. SETOSA (Spreng.) Trin. ex Hook. fil. & Jackson, Ind. Kew. iii. 209 (1894). *Polypogon setosus* Spreng. Mant. Fl. Hal. 31 (1807). *P. glomeratus* Willd. Enum. 87 (1809). *Alopecurus glomeratus* (Willd.) Poir. in Lam. Encycl. v. 495 (1817). *Agrostis setosa* (Spreng.) Muhl. Descr. Gram. 68 (1817). *Trichochloa glomerata* Trin. Fund. Agrost. 117 (1820). *T. calycina* Trin. l. c. (1820). *M. glomerata* (Willd.) Trin. Gram. Unifl. 191, pl. 5, fig. 10 (1824). *M. calycina* Trin. l. c. 193 (1824). *Podosaemum glomeratum* (Willd.) Link, Hort. Berol. i. 84 (1827). *Cinna glomerata* (Willd.) Link, l. c. ii. 237 (1833). For specific characters see no. 5 in key.—Typical *M. setosa* has the leaves of flowering culms 7–15, many of them often browded and overlapping at the middle nodes; panicle purplish, fuscous or green, with all but the lowest of the densely flowered ellipsoid to rounded-obovoid branches closely crowded, the panicle thus appearing densely lobulate-spiciform; keel and awns of glumes copiously hispid, thus giving the inflorescence a "misty" aspect.—Meadows, bogs and wet shores, western Nova Scotia and southern Maine to southern Ontario and Michigan, south to southern New England, northern New Jersey, Pennsylvania, mountains to North Carolina, and Indiana. PLATES 755 and 756; MAP 1.

Var. **cinnoides** (Link), comb. nov. *Dactylogramma cinnoides* Link, Enum. Hort. Berol. ii. 248 (1833).—Differing from typical *M. setosa* in having fewer (5–8, rarely –10) and usually more scattered leaves; panicle usually green, rarely purple-tinged, usually more interrupted, the cylindric to oblong-ovoid often subacute lower branches often remote; glumes slightly broader, with merely scabrous keel and awn (the panicle, therefore, not appearing "misty").—Similar habitats, Newfoundland to Alberta, south to Nova Scotia, northern Massachusetts, Connecticut, New York, central Pennsylvania, Michigan, Wisconsin, Minnesota, Wyoming, Nevada and Oregon. PLATE 757; MAP 2.

PLATE 749. MUHLENBERGIA FRONDOSA (Poir.) Fern.: FIGS. 1, 2 and 3, fragments from TYPE of *Agrostis foliosa* Roem. & Schultes, × 5, from portions of type in Herb. U. S. Nat. Mus., kindness of Mr. *Jason R. Swallen;* FIG. 4, two spikelets, × 4, from Bridgeport, Connecticut, September 7, 1893, *Eames;* FIG. 5, floret, × 10, from Shirley, Massachusetts, October 4, 1914, *J. R. Churchill;* FIG. 6, grain, × 10, from last specimen.

PLATE 750. MUHLENBERGIA FRONDOSA (Poir.) Fern.: FIG. 1, a characteristic decumbent branch, × ⅓, from East Jaffrey, New Hampshire, *B. L. Robinson*, no. 395; FIG. 2, characteristic glabrous internode, open and compressed sheaths and partly included axillary panicle, × 5, from Stratford, New Hampshire, *Pease*, no. 23,921; FIG. 3, portion of rhizome, × 4, to show cucullate-arching scales, from no. 23,921.

PLATE 751. MUHLENBERGIA MEXICANA (L.) Trin.: FIG. 1, TYPE of AGROSTIS MEXICANA L., basis of the species, × ½, from Herb. Linn., kindness of the late Dr. *B. Daydon Jackson;* FIG. 2, portion of panicle of TYPE, × 5, from fragment in Herb. U. S. Nat. Mus., kindness of Mr. *Jason R. Swallen;* FIG. 3, two spikelets, × 10, from Lanoraie, Quebec, *Victorin & Rolland*, no. 29,030.

PLATE 752. MUHLENBERGIA MEXICANA (L.) Trin.: FIG. 1, plate of Jacquin f., × ⅖; FIG. 2, portion of opaque and puberulent internode and node and base of sheath, × 5, from Worthington, Massachusetts, *B. L. Robinson*, no. 649; FIG. 3, floret, × 10, from St.-Hubert, Quebec, *Victorin & Rolland*, no. 33,968; FIG. 4, grain, × 10, from shore of Delaware River, Sussex County, New Jersey, September 15, 1917, *E. B. Bartram.*

PLATE 753. MUHLENBERGIA RACEMOSA (Michx.) BSP.: FIG. 1, TYPE (two pieces) × ½, of *Agrostis racemosa* Michx., basis of species, from Herb. Michaux, Paris, kindness of Professor *Humbert;* FIG. 2, panicle, × 1, from Menard County, Illinois, 1861, *E. Hall;* FIG. 3, panicle, × 1, from near Princeville, Peoria County, Illinois, *V. H. Chase*, no. 940; FIG. 4, spikelet, × 10, from Fort Snelling, Minnesota, *Mearns*, no. 747; FIG. 5, floret, showing basal villi, × 10, from no. 747; FIG. 6, grain, × 10, from near Oquawka, Illinois, *Patterson.*

PLATE 754. MUHLENBERGIA RACEMOSA (Michx.) BSP.: FIG. 1, a characteristic summit of a plant, × 1, from Fort Snelling, Minnesota, *Mearns*, no. 747; FIG. 2, summit of glabrous and lustrous internode and node and base of sheath, × 5, from La Crosse, Wisconsin, 1861, *T. J. Hale;* FIG. 3, portion of panicle, × 4, to show the small anthers, from near Princeville, Peoria County, Illinois, *V. H. Chase*, no. 940.

PLATE 755. MUHLENBERGIA SETOSA (Spreng.) Torr.: FIG. 1, TYPE of *Polypogon setosus* Spreng., basis of the species, × ca. ⅓, from Herb. Berol., kindness of Professor *Diels;* FIG. 2, panicle, × 1, from Walpole, Massachusetts, September 7, 1896, *J. R. Churchill;* FIG. 3, panicle, × 1, from northwest of Pleasant Valley, Bucks County, Pennsylvania, September 15, 1923, *Benner;* FIG. 4, portion of rhizome, to show appressed scales, × 4, from west of Centreville, Digby County, Nova Scotia, *Graves & Linder*, no. 19,865; FIG. 5, portion of panicle, × 4, to show long anthers, from Walpole, Massachusetts, September

2, 1883, *Walter Deane;* FIG. 6, group of spikelets, × 10, from Muddy Pond, West Roxbury, Massachusetts, *C. E. Faxon;* FIG. 7, floret, × 10, showing few slender basal villi, from Mt. Bethel, Northampton County, Pennsylvania, October 4, 1908, *Van Pelt;* FIG. 8, grain, × 10, from the last (*Van Pelt*) specimen.

PLATE 756. MUHLENBERGIA SETOSA (Spreng.) Trin.: FIG. 1, TYPE of *Polypogon glomeratus* Willd., basis of *M. glomerata* (Willd.) Trin., × ⅓, from Herb. Willdenow, kindness of Professor *Diels;* FIG. 2, opaque and puberulent internode and node and base of sheath, × 5, from northwest of Pleasant Valley, Bucks County, Pennsylvania, September 15, 1923, *Benner.*

PLATE 757. MUHLENBERGIA SETOSA (Spreng.) Trin., var. CINNOIDES (Link) Fern.: FIG. 1, TYPE of *Dactylogramma cinnoides* Link, basis of the variety, × ca. ⅓, from Herb. Berol., kindness of Professor *Diels;* FIG. 2, panicle, × 1, from Grand Falls, Newfoundland, *Fernald & Wiegand*, no. 4531; FIG. 3, portion of panicle, to show elongate anthers (as black lines), × 4, from Fort Kent, Maine, August 21, 1913, *R. W. Woodward;* FIG. 4, floret, to show villi running high on lemma, × 10, from no. 4531; FIG. 5, grain, × 10, from River Ste. Anne des Monts, Gaspé County, Quebec, August, 1905, *Collins & Fernald.*

II. NOTES ON DANTHONIA

The two common species of *Danthonia* in eastern Canada, New England and New York are in general well defined, although the conventional differential characters of the lemma used by Hitchcock in Gray's Manual, ed. 7, and by Nash in Britton & Brown's Illustrated Flora are essentially valueless. As expressed by Hitchcock these are:

"Teeth of the lemma triangular, not aristate.....1. *D. spicata.*
Teeth of the lemma aristate.
Flowers not over 5 mm. long.....2. *D. compressa.*"

Under the specific treatments the lemmas of *D. spicata* are said to be "4–5 mm. long, sparsely clothed with stiff hairs, *teeth triangular*", while *D. compressa* has the "*teeth of the lemma aristate, at least 2 mm. long.*" In practice this character so frequently breaks that it has been abandoned by later authors, and in his Manual Hitchcock relies upon the contracted panicle and relatively short blades of *D. spicata* as contrasted with the more open panicle and longer leaves of *D. compressa.*

The best key I have seen is that of Wiegand & Eames in their Flora of the Cayuga Lake Basin. For wholly typical *D. spicata* and *D. compressa* it is satisfactory; the difficulty is that so much material is not typical. In the series which everyone would accept as *D. spicata* in the broad sense, the lemma varies from 2–6.5 mm. long and its back may be densely pilose, sparingly pilose, strigose or quite glabrous, its teeth from broadly triangular to lance-attenuate and awnless or awned. Such variation is

largely without apparent geographic limit, though two well defined geographic varieties, var. *pinetorum* Piper and var. *longipila* Scribn. & Merr., are strongly marked; the former boreal and transcontinental, with lemmas often so large as to be mistaken for those of *D. intermedia* Vasey; the latter with the shortest lemmas of the series and a definitely southern range. The sheaths and blades of any of the variations may be glabrous, sparingly pilose or even long-villous; and to the latter tendency, without checking the original account, has been erroneously applied the name var. *longipila.* If forms of the common northern plant with pubescent foliage are to be distinguished, they have an earlier name, evidently intended for them, in *D. spicata,* var. *villosa* Peck (1894).

My chief reason for now publishing this note is to direct attention to a complex series of very large plants which in some ways stand between *Danthonia spicata* and *D. compressa* but which, in extreme development, have been mistaken for the southeastern *D. sericea* Nutt. These are the coarse midsummer- or autumn-flowering plants with stout culms up to 1 m. high; long, stiff and mostly erect basal leaves; panicle as in *D. spicata* but with more numerous and larger spikelets; glumes up to 2.5 cm. long; and lemmas up to 6.5 mm. long; these and the long glumes often leading collectors to place New England specimens with the more southern *D. sericea.* In this complex and mostly northern coarse series the culms may be terete to base, as in *D. spicata,* or the lower internodes may be trigonous or laterally compressed and with the narrower side broadly concave, as in *D. compressa.* The uppermost leaf may be short and remote from the long-exserted panicle, as in *D. spicata,* or (even from the same root) prolonged and reaching or overtopping the panicle as in *D. compressa.* The twisted base of the awn may be dark brown to purplish, as in *D. spicata,* or stramineous or pale, as in *D. compressa.* The panicle is more like that of *D. spicata* but large and dense. Furthermore, whereas *D. spicata* (typical) flowers in New England from late May to early July and *D. compressa* in June and July, the coarse plant flowers chiefly from August to October. If culms with trigonous to compressed lower internodes be selected they will belong to *D. Alleni* Austin (1872), while other culms (often in the same tussock), with the inter-

nodes terete, will be *D. Faxoni* Austin (1877). It might be assumed that *D. Alleni* (including *D. Faxoni*) is a series of hybrids, with unusual hybrid vigor; but it is found to the northeast of the limit of *D. compressa*, while to the northwest it extends 450 miles north of the northwestern limit of the latter species. If sometimes a hybrid it is not always so.

In many of its stations *Danthonia Alleni* occurs in recent clearings or burns where the loose litter and often the ashes from fires stimulate all plants; in such cases it appears like overstimulated specimens, in which rankness of growth, multiplication of spikelets and enlargement of their parts are the result. In other cases the autumnal coarse culms and panicles suggest the second flowering in many species of *Carex*, where autumnal inflorescences are larger, fuller and often more crowded than the normal vernal ones. Again, the panicles of *D. Alleni* may be greatly distorted and with apparent signs of fungus- or insect-attack, with gnarled or crumpled branches, tendencies to fasciation, and sometimes the gathering of spikelets into glomerules. All in all, *D. Alleni* is a heteromorphic series well worth close observation by those situated to watch it. That it is a true species is very improbable. It is presumably the result of very diverse conditions which have resulted in parallel developments; and, in view of the well known development within the leaf-sheaths of this genus of cleistogamous florets, it is not improbable that every alteration of *D. spicata* and *D. compressa*, whether by crossing through wind-pollination or stimulation in other ways, may be somewhat perpetuated through the cleistogenes. Similarly the very diverse lemmas of *D. spicata*, whether with awnless or awned teeth triangular or lanceolate, the backs pilose or glabrous, may thus be carried on in local colonies. The genus is an appropriate one for close study from many viewpoints.

I am distinguishing the two undoubted species and the wholly dubious *Danthonia Alleni* by the following characters.

a. Culms erect or straight, with stiffly erect panicles, the internodes terete (sometimes compressed or triangular in no. 2); basal crowded leaves much shorter than culm (sometimes elongate in no. 2), the lower cauline ones commonly 3–15 cm. long, the uppermost (except sometimes in no. 2) usually 1–10 cm. long and becoming remote from the panicle; ligule (except sometimes in no. 2) of stiff hairs 0.4–1.5 mm. long; panicle-branches ascending to erect, tightly appressed in fruit; spiraling base of awn usually

dark brown to purplish, strongly contrasting with the paler and straightish summit.

Culms slender, 0.5–1.5 mm. thick (dried) at base, 1–6 dm. high, with terete internodes; panicle remote from upper leaf, mostly with 2–13 spikelets; longer glume 7–11 mm. long, if longer with faint or obscure lateral nerves; base of awn dark-colored ..... 1. *D. spicata.*

Culms stout, 1.5–2.5 mm. thick at base, mostly 0.5–1 m. high, the lower internodes terete, or triangular and with one concave side; panicle either remote or closely subtended by upper leaf, dense, usually with 9–20 spikelets; longer glume lance-attenuate, 1.1–2.5 cm. long, prominently 3–7-ribbed; base of awn light to dark brown .... 2. *D. Alleni.*

a. Culms slightly geniculate at the nodes, the summit usually arching; some of the lower internodes trigonous or compressed and often with the narrower side broadly concave; basal leaves prolonged, one half as long as to equaling culm; lower cauline leaves prolonged, 1.5–4 dm. long, the uppermost nearly reaching or overtopping the panicle; ligule 2–4 mm. long, of flexuous hairs; panicle lax and open or with branches finally loosely ascending, the remote lower branches usually strongly divergent, not closely appressed in fruit; spiraling base of awn pale brown or stramineous ..... 3. *D. compressa.*

1. D. SPICATA (L.) Beauv. consists of three fairly defined and many less definite variations, as follows.

a. Column of florets three fourths to quite as long as the firm glumes; panicle with (1–) 2–13 (–15) spikelets; lower leaves flat or involute; culms firm, 0.5–1.5 mm. thick at base.

Glumes lance-attenuate, tapering from near base, with 3–5 strong ribs besides the midrib, covering only the base of the column of florets, the sinus at crossing of the glumes one sixth to one fourth as high as the tip of the longest glume; basal marcescent leaves strongly curving and twisting *D. spicata*, var. *typica.*

Glumes oblong-lanceolate, tapering from near or above the middle, with weak or obscure lateral ribs, usually covering all but the summit of the column of florets, the sinus at crossing of the glumes one fourth to half as high as the tip of the upper glume; basal leaves only slightly if at all curling ..... Var. *pinetorum.*

a. Column of florets only one half to three fifths as long as the thin and hyaline ribless or only faintly ribbed glumes; spikelets 3–7, scattered; culms delicate, 0.5–1 mm. thick at base; basal leaves filiform-involute or becoming so, curved ..... Var. *longipila.*

D. SPICATA (L.) Beauv., var. **typica.** *Avena spicata* L. Sp. Pl. i. 80 (1753). *A. glumosa* Michx. Fl. Bor.-Am. i. 72 (1803). *D. glumosa* (Michx.) Beauv. Ess. Agrost. 92, 153 and 160 (1812). *D. spicata* (L.) Beauv. ex Roem. & Schultes, Syst. ii. 690 (1817). *Merathrepta spicata* (L.) Raf. ex Hook. f. & Jacks. Ind. Kew. iii.

211 (1894) in synonymy. *D. spicata*, var. *villosa* Peck in N. Y. State Mus. Ann. Rep. xlvii. 168 (repr. 42) (1894), the form with villous blades. *Pentameris spicata* (L.) Nels. & Macbr. in Bot. Gaz. lvi. 470 (1913).—Dry to damp and peaty soils or in thin woodland, southern Quebec to Minnesota, south to Nova Scotia, New England, Long Island, northwestern Florida, Alabama, Tennessee and Missouri. May–early July.

Var. PINETORUM Piper, as *D. spicata pinetorum* Piper in Erythea, vii. 103 (1899), described in detail, although its author did not appreciate the characters, saying of it "scarcely more than a variety of that species [*D. spicata*], differing mainly in character of pubescence." *D. thermalis* (as *thermale*) Scribn., U. S. Dept. Agric., Div. Agrost. Circ. no. 30: 5 (1901). *Merathrepta pinetorum* (Piper) Piper, Contrib. U. S. Nat. Herb. xi. 122 (1906). *M. thermalis* (as *thermale*) (Scribn.) Heller, Muhlenbergia, v. 120 (1909). *M. thermalis* (as *thermale*), var. *pinetorum* (Piper) Piper ex Fedde & Schust. in Just, Bot. Jahresb. xxxvii. 128 (1911). *Pentameris thermalis* (as *thermale*) (Scribn.) Nels. & Macbr. l. c. (1913). *D. pinetorum* (Piper) Piper in Piper & Beattie, Fl. Nw. Coast, 46 (1915).—Dry to moist open soil, Newfoundland and Côte Nord, Quebec, to British Columbia, south to Nova Scotia, New Brunswick, northern New England, Bruce Peninsula, Ontario, northern Michigan, northern Wisconsin, Black Hills, South Dakota, New Mexico and Oregon.—Since this variety has not been heretofore recorded from east of northern Michigan a few characteristic eastern specimens of it may well be cited. NEWFOUNDLAND: Glenwood, *Fernald & Wiegand*, no. 4600; Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, nos. 4601 and 4602; St. John's Island, *Fernald et al.* no. 27,466; Middle Arm, Bonne Bay, *Fernald, Long & Fogg*, no. 1300; North Arm, Bay of Island, *Long & Fogg*, no. 74; French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 76; Blomidon ("Blow-me-down") Mountains, *Fernald & Wiegand*, nos. 2591 and 2595; Mt. Musgrave to Humber Mouth, *Fernald & Wiegand*, no. 2590. QUEBEC: Mingan, *St. John*, no. 90,140; Anticosti Island, *Victorin*, or *Victorin et al.* nos. 4077, 20,536 and 20,537, 20,542, 20,598, 24,344–24,346, 27,795, 27,797, 27,798, 28,050, 28,055 and 28,060; Percé, *Fernald & Collins*, no. 870; River Ste. Anne des Monts, *Fernald & Collins*, no. 413; Bic, *Fernalds & Collins*, no. 869; Rivière du Loup, *Victorin*, nos. 22 and 81; Montmorency Falls, *Macoun*, no. 69,231; Saint-Romuald, *Louis-Marie*, no. 20,541. NEW BRUNSWICK: Bass River, July 30, 1875, *Fowler;* Shediac Cape, *F. T. Hubbard*, no. 720. NOVA SCOTIA: St. Paul Island, *Perry & Roscoe*, nos. 64–66; Middleton, *Fernald, Pease & Long*, no. 19,953; Argyle, *Long & Linder*, no. 19,957; Abram River, *Fernald, Bean & White*, no. 19,956. MAINE: at 4000–4500 ft., North Basin, Mt. Katahdin, July 14, 1900, *Fernald;* Township

ix, Range 17, Somerset County, *St. John*, no. 2134; Madison, August 21, 1894, *Fernald*. NEW HAMPSHIRE; near Half-way House, Thompson & Meserve Purchase, *Pease*, no. 12,817. VERMONT: Willoughly, July 11, 1896, July 18, 1898 and September 14, 1898, *G. G. Kennedy*.

Var. LONGIPILA Scribn. & Merr. U. S. Dept. Agric., Div. Agrost. Circ. no. 30: 7 (1901).—Sandy or rocky woods and clearings, North Carolina and Alabama to New Mexico, north to Connecticut, Pennsylvania, Kentucky, Missouri and eastern Kansas. Late May–September, The following are characteristic. CONNECTICUT: Woodbury, July 13, 1932, *Eames*. PENNSYLVANIA: Philadelphia, 1862, *C. E. Smith*. VIRGINIA: eastern slope of Bull Run Mountain, Prince William County, *Allard*, no. 3850; south of Aldie, Fauquier County, *Allard*, no. 859; 4 miles northwest of Dixie Caverns, Roanoke County, *Wood*, no. 2609; Great Neck, Princess Anne County, *Fernald, Griscom & Long*, no. 4553; Claremont Wharf, Surry Co., *Fernald & Long*, no. 9829; Carey Bridge, Southampton County, *Fernald & Long*, no. 11,950; Cypress Bridge, Southampton County, *Fernald & Long*, no. 11,949. NORTH CAROLINA: Locust, Stanly County, *Blomquist, Correll & Garren*, no. 7753; Highlands, Macon County, *Biltmore Herb.*, no. 343°. KENTUCKY: Hawesville, Hancock County, *E. J. Palmer*, no. 17,804. ALABAMA: Mobile, *C. Mohr*, as *D. sericea*. MISSOURI: Indian Creek, Benton County, *Demetrio*, no. 87; Mansfield, *Lansing*, no. 3103. KANSAS: Cherokee County, *Hitchcock*, no. 905. OKLAHOMA: base of Rich Mt., near Page, Leflore County, *Stevens*, no. 2674. TEXAS: Dallas, *Reverchon;* Terrell, Kaufman County, May 4, 1904, *F. J. Tyler*. NEW MEXICO: 1847, *Fendler*.

When they published var. *longipila*, from Arkansas, Scribner & Merrill laid stress on the "scattered ascending hairs", on the leaf-blades, a character which appears in the other varieties of the species and which may be absent from much material of otherwise good var. *longipila*. The distinctive features of this southern extreme are the very slender culms, usually filiform-involute leaves, and the small florets in relatively short columns, characters brought out in the original description: "A slender form . . . with small, few-flowered panicles and smaller spikelets than in the species. Leaf blades very narrow, involute . . . Flowering glumes 2 to 2.5 mm. long, pilose."

2. D. ALLENI Austin in Bull. Torr. Bot. Cl. iii. 21 (1872). *D. Faxoni* Austin, l. c. vi. 190 (1877).—Open shores, rocky or arid openings, clearings and burns, Magdalen Islands to Algoma District, Ontario, south to Nova Scotia, Maine, Massachusetts,

Delaware, mountains of North Carolina, and Ohio. Late June–October.—The following, selected from twice as many specimens, are characteristic. QUEBEC: Baie St. Paul, Charlevoix County, *Pease*, no. 27,471. MAGDALEN ISLANDS: Grindstone, *Fernald, Bartram, Long & St. John*, no. 6870. PRINCE EDWARD ISLAND: Alberton, *Fernald & St. John*, no. 6869. NOVA SCOTIA: Canso, Guysborough County, *Rousseau*, no. 35,452 bis; Bridgewater, Lunenburg County, *Fernald et al.*, no. 19,951. MAINE: Houlton, *Fernald & Long*, no. 12,659; Orono, September 25, 1890, and September 1, 1893, *Fernald;* Peaked Mt., Clifton, August 22, 1897, *Fernald;* Pleasant Pond, Somerset County, August 18, 1902, *Collins & Chamberlain;* Chesterville, *Kate Furbish;* Oxford, July 12, 1914, *Weatherby;* Pleasant Mt., Denmark, *Pease*, no. 19,628; Cutler, August 19, 1902, *Kate Furbish;* Pembroke, *Fernald*, no. 1309; Somesville, Mt. Desert I., September 22, 1892, *Fernald;* Southport, August 1, 1894, *Fernald;* Bear Mt., Livermore, July 25, 1896, *Kate Furbish;* South Berwick, *Parlin & Fernald*, no. 934. NEW HAMPSHIRE: Gorham, *Pease*, no. 17,337; Notch of the White Mts., August 27 and September 3, 1877, *C. E. Faxon*, TYPE collection of *D. Faxoni;* Crawford Notch, *Greenman*, nos. 1276 and 1277; Crawford Notch, Hart Location, *Pease*, no. 11,727; base of Mt. Willard, August 28, 1877, *Faxon;* North Woodstock, Woodstock, *Fernald*, no. 11,550; Plymouth, *Fernald*, no. 14,995; Washington, *Fernald & Svenson*, no. 768; Nashua, *Fernald & Svenson*, no. 769; Pelham, 1895, *F. W. Batchelder*. MASSACHUSETTS: Amesbury, 1897, *A. A. Eaton;* Pepperell, August 30, 1886, *C. W. Swan;* Concord, September 8, 1858, *Thoreau;* Ashland, July 3, 1884, *W. Deane;* Savin Hill, Dorchester, September 5, 1852, *Wm. Boott;* Plymouth, *Fernald*. no. 767; Brewster, *Fernald*, no. 17,948; Chatham, *Fernald & Long*, no. 8751; Nantucket Island, *Bicknell*, no. 9854; Shrewsbury, *J. W. Robbins*, as *D. sericea* Nutt.; Whitcombe Summit, Berkshire County, *H. D. House*, no. 25,893. NEW YORK: Babylon, Long Island, *T. F. Allen*, ISOTYPES of *D. Alleni*, also *Svenson*, no. 6800; Rockaway, Long Island, September 20, 1869, *W. H. Leggett:* NEW JERSEY: Manasquan, June 26, 1929, *J. R. Churchill*. PENNSYLVANIA: Chester Valley, 2 miles north of Devon, Chester County, October 24, 1921, *H. B. Meredith*. DELAWARE: **"WM. M. CANBY,** WILMINGTON, DELAWARE". NORTH CAROLINA: Roan Mt., July, 1889, *Scribner*. ONTARIO: Cloche Peninsula, Manitoulin District, *Fernald & Pease*, no. 3103; cliffs by Lake Superior, Pancake Bay, Algoma District, *Pease & Ogden*, no. 24,989. OHIO: near Garrettsville, Portage County, June 19, 1910, *A. N. Rood*.

3. D. COMPRESSA Austin in Peck, N. Y. State Mus. Ann. Rep. xxii. 54 (1869). *D. spicata*, var. *compressa* (Austin) Wood, Am. Bot. and Fl. pt. 4: 396 (1873). *Merathrepta compressa* (Austin) Heller, Muhlenbergia, v. 120 (1909). *Pentameris compressa*

(Austin) Nels. & Macbr. in Bot. Gaz. lvi. 469 (1913).—Woodlands and clearings, southern Quebec to Ohio, south to Nova Scotia, New England, Long Island, Virginia, and upland of North Carolina and Tennessee. June–August.

III. ERIANTHUS BREVIBARBIS AND OTHER SPECIES

(Plates 758–761)

ERIANTHUS **coarctatus,** sp. nov. (TAB. 758), culmis rigidis 0.75–1.5 m. altis, ad basin 3–6 mm. diametro, nodis 4–6 barbatis barbis deciduis; foliis caulinis 4–6, vaginis glabris, laminis scabris e basi valde angustato sublanceolato-linearibus 2–10 mm. latis nerviis lateralibus prominulis utrinque 3–5; lamina superiore valde reducta 4–12 cm. longa; panicula lanceolata densa 1–1.7 dm. longa 3–4 cm. diametro basi deinde exserta, racemis valde adpressis 2–5 cm. longis; spiculis sessilibus lanceolatis, glumis strigoso-hirtellis 6.5–8 mm. longis, coma basilari 4–5 mm. longa; pedicellis strigoso-hirtellis; arista tereti porrecta 1.6–2 cm. longa. —Delaware, eastern Maryland and eastern Virginia. DELAWARE: fencerow, ¼ mile east of Ellendale, Sussex County, October 12, 1940, *R. R. Tatnall,* no. 4745. MARYLAND: roadside 5 miles north of Princess Anne, Somerset County, October 2, 1937, *R. R. Tatnall,* no. 3574. VIRGINIA: peaty swale (cut-over cypress swamp), about 4 miles northwest of Homeville, Sussex County, September 20, 1937, *Fernald & Long,* no. 7301, as *E. brevibarbis* Michx. (TYPE in Herb. Gray); alluvial woods along Nottoway River, Green Church Bridge, northwest of Owen's Store, Sussex County, October 14, 1941, *Fernald & Long,* no. 13,884. All but the last distributed as *E. brevibarbis.*

Var. **Elliottianus,** var. nov., planta major; culmis ad 2 m. altis ad basin 6–10 mm. diametro; laminis 7–12 mm. latis; panicula laxiore majoreque 2–4.5 dm. longa 4.5–10 cm. diametro, racemis 4–8 cm. longis.—North Carolina to Florida. TYPE: thicket bordering pond near Live Oak, Florida, October 10, 1901, *A. H. Curtiss,* no. 6940, as *E. alopecuroides,* var. *brevibarbis.*—The plant beautifully described as *E. brevibarbis* by Elliott, Sk. i. 39 (1816) and very crudely illustrated by him.

Erianthus coarctatus and var. *Elliottianus* have passed, ever since Elliott, as *E. brevibarbis* Michx. Nash in North Am. Fl. xvi[1]. 93 (1909) cites for *E. brevibarbis* the "TYPE LOCALITY: Tennessee" and then gives the range "Delaware to Florida, west of Louisiana"; while Hitchcock, Man. 723 (1935) says "Moist places, Coastal Plain, Delaware to Florida and Louisiana", but on p. 854 cites the type as from "Tennessee and Carolina, *Michaux.*" Michaux, in originally describing it, Fl. Bor.-Am. i.

55 (1803), said "*HAB.* in collibus Tennassée et Carolinae". The discrepancy in Michaux's statement (and his label) and the Coastal Plain range of the plant usually taken to be *E. brevibarbis* has often been noted; and when Hitchcock examined the Michaux TYPE he wrote:

> **Erianthus brevibarbis** Michx.
>
> "In collibus desertis ab amnio Wabash ad Ostium Missouri 5 diebus distantibus". The specimen belongs to the species described in Small's Flora under this name. The range as originally published is "in collibus Tennassée et Carolinae". The known range is from Delaware southward along the coast to Florida, and west to Louisiana. We do not know of its occurrence in southern Illinois, as given on Michaux's label.—Hitchc. Contrib. U. S. Nat. Herb. xii[3]. 151 (1908).

Michaux's type, with the label as quoted by Hitchcock, is here reproduced × ½, as PLATE 759, FIG. 1. That it is very unlike the Coastal Plain plant for which it has passed is evident. Its apparently mature and disintegrated panicle is hidden amongst the broad and prolonged leaves and enlargements of the spikelets, FIG. 2, × 1½, show them to be like those of the plant (PLATE 760) of Pulaski County, Arkansas, distributed by Dr. Delzie Demaree (by creek near old quarry, Pulaski Heights, Little Rock, September 23, 1931, *Demaree*, no. 8228). Like that of the Michaux type the panicle (PLATE 760, FIG. 1, × ½) of Demaree's no. 8228 is disintegrating. In equivalent latitudes of the Coastal Plain *E. coarctatus* sheds its fruit from mid-October into November. Since the Demaree plant is so like Michaux's type from well up in the Mississippi Valley we may note that it has 10, instead of only 4–6 nodes; the leaf-blades broader (up to 1.5 cm. wide) and with more numerous veins (the more prominent veins 6–8 each side of the midrib); the mature panicle partly included at base and greatly exceeded by the broad upper blade (2.3 dm. long); the glumes (PLATE 759, FIG. 3, × 6) with glabrous and lustrous surfaces (Michaux said "valvis acutissimis, nudis"); the more abundant beard up to 6 mm. long; and the awn (PLATE 760, FIG. 3, × 3) only 8–10 mm. long, less than twice, instead of nearly thrice the length of the glumes.

The collection in Arkansas of a plant which closely matches the Michaux type and which is so different from the *Erianthus* "*brevibarbis*" of most authors supports Michaux in his statement on the label. Although the assertion (generally attributed to

Richard who issued the work after the death of Michaux) in the original publication, that it came from hills of Tennessee and from Carolina does not coincide with the original label, there is now clear evidence that a plant like Michaux's does occur in the Mississippi basin. It is not without significance that Hackel, the master of the *Gramineae*, doubted the identity of Michaux's plant with that of Elliott. In his great work on the *Andropogoneae* in DC. Mon. Phan. vi. 131 (1889), treating *E. brevibarbis*, as *E. saccharoides* subsp. *brevibarbis*, he accurately described the newly recognized *E. coarctatus*, var. *Elliottianus*, doubting if he had the Michaux species (transferred by Persoon to *Saccharum*), his citations reading: "Er. brevibarbis Mich. . . . ?, certe Elliott, Sketch . . . et aliorum auctt. amer.; Sacch. brevibarbis Pers. . . . ?" His doubt seems to have been justified; at least, *E. coarctatus* and *E. brevibarbis* seem quite as distinct as do most of our species in the genus. As to the range of the latter, it is yet to be worked out. The botanists of Indiana, Illinois, Tennessee and Missouri seem not to have noted it; and, although Demaree's label bears the memorandum, "New to Ark.", Hackel, l. c. cited as *E. brevibarbis* Arkansas material at Berlin, received from Engelmann. Michaux's label, giving the data, on dry hills 5 days distant from the River Wabash toward the mouth of the Missouri, means that he got it in southern Illinois, presumably between Jefferson County at the east and Randolph County at the west. On August 23, 1795, Michaux, with an Indian, and a horse to carry his baggage, left Vincennes on the Wabash, in Knox County, Indiana, and on the 28th spent the day drying out his water-soaked collections by a camp-fire, reaching Kaskaskia, in Randolph County, Illinois, on the 30th. From late August to October 2 he collected up and down the Mississippi, with Kaskaskia as a base, and then returned to the Ohio. Five days travel from Vincennes, allowing for the stops recorded in Michaux's diary, means that he got *Erianthus brevibarbis* in southwestern Illinois; and it is clear that his overmature material was collected, at latest, in early October. The latter fact and the over-ripe material from Arkansas, collected on September 23, indicate that true *E. brevibarbis*, although little known, is a relatively early species to mature.

In habit and in dense panicle with appressed-ascending

branches, typical *Erianthus coarctatus* strongly suggests *E. strictus* Baldwin; but the panicle of *E. strictus* is more slender and elongate and its spikelets are naked at base or with the merest suggestion of a greatly abbreviated coma at the tips of some pedicels. Furthermore, in eastern Virginia *E. strictus* is the earliest-flowering species of the genus, our 8 collections, from young anthesis to mature fruit ranging in date from July 20 to September 19, with a single one, from wet woods, secured on October 18; the Virginia collections of *E. coarctatus*, both immature, were made on September 20 and on October 14.

Michaux, who established the genus *Erianthus*, did not realize the complexity of the genus. He recognized but two species: his *E. saccharoides*, "a Carolina ad Floridam", with "gluma villis involucrantibus multo breviore", identical with *Anthoxanthum giganteum* Walt. (1788); and *E. brevibarbis*. *E. strictus*, *E. coarctatus* and other species which he must have encountered and collected, were not worked out by him or, presumably, were confused with those of which types are preserved.

Related to *Erianthus brevibarbis* and *E. coarctatus* in having the terete awns projected forward (rather than flattened ones spirally twisted at base and with the straightish tip thrown somewhat to one side) are two plants with thicker panicles and with coma exceeding the glumes: *E. saccharoides* Michaux or *Anthoxanthum giganteum* Walt. = *E. giganteus* (Walt.) F. T. Hubbard and sensu Hitchcock, but certainly not *E. giganteus* Muhl., to whom Hitchcock erroneously ascribes the species; and *E. compactus* Nash. Before considering the differences between these two it is necessary to consider the correct name for the plant which Hitchcock, Man., is calling *E. giganteus*, for it is quite clear that his discussion (Man. p. 854) was based on confused ideas and inaccurate quotation of Muhlenberg's Catalogue. Hitchcock's paragraph is as follows:

(5) **Erianthus giganteus** (Walt.) Muhl., Cat. Pl. 4. 1813. Based on *Anthoxanthum giganteum* Walt. Later (Descr. Gram. 192. 1817) Muhlenberg uses the name for both *E. saccharoides* [Michx., 1803] and *E. alopecuroides* [L. (Ell.)] (his herbarium specimen under this name including both species), but the description (awn twisted) applies better to *E. alopecuroides*. *Erianthus giganteus* was published as new by Hubbard (Rhodora **14:** 166 (1912) based on *Anthoxanthum giganteum* Walt.

If, as Hitchcock definitely states, the name *Erianthus giganteus* Muhl. Cat. had been based on *Anthoxanthum giganteum* Walt., there was no need of a new combination by Hubbard; but Hubbard in 1912 was following the International Rules of that period and, as he clearly and correctly explained, *E. giganteus* Muhl. Cat. (1813) was NOT based on *Anthoxanthum giganteum* Walt., but was a change of name by Muhlenberg of *Andropogon alopecuroides* L. Since by present-day rules Muhlenberg had no right to give the new specific name, instead of using the one assigned by Linnaeus, Muhlenberg's quite new name, *Erianthus giganteus*, is illegitimate; but, by the "homonym rule", adopted in the International Rules since Hubbard wrote, there is no room for a second *E. giganteus*, based on Walter's name, especially since Walter's species is admittedly identical with *E. saccharoides* Michx. As to Hitchcock's flat statement that Muhl. Cat. (1813) based the name *E. giganteus* upon *Anthoxanthum giganteum* Walt., the following reproductions of Muhlenberg's text indicates that the statement could not have been verified. The first reproduction is from ed. 1 (1813), the second from ed. 2 (1818).

[1]	26. ANTHOXANTHUM,	SPRING GRASS,	
	2. giganteum Walter v. erianthus	gigantic,	
	27. ERIANTHUS,	ERIANTHUS,	semen 1.
	1. giganteus, ♃ andropogon, alopec. L.	gigantic,	Car. Virg.
[2]	27 ANTHOXAN′-THUM	SPRING GRASS	semen 1.
	2 giganteum, Walter. v. erianthus	gigantic	
	28 ERIANTHUS	ERIANTHUS	semen 1.
	1 giganteus ♃ *Andropogon alopec.* L.	gigantic	Car. Virg.

It is perfectly clear that Muhlenberg was maintaining Walter's *Anthoxanthum giganteum* under *Anthoxanthum!*, though with the rather vague intimation ("v. [vel] erianthus") that it was perhaps an *Erianthus*. He made no combination based directly upon it; but his *Erianthus*, the next genus, consisted of two other species, 1. *giganteus*, a substitute-name for *Andropogon alopec*[*uroides*] L., and 2. *E. brevibarbis* Michx., already discussed. In his Cat.

ed. 2: 4 (1818) Muhlenberg repeated (see quotation above) the treatment of ed. 1, merely making *Andropogon alopecuroides* more emphatically the nomenclatural basis of *E. giganteus* by using italics: "1 giganteus *Andropogon alopec.* L."

There is no question, apparently, about the identity of *Erianthus alopecuroides* (L.) Ell., which was based on *Andropogon alopecuroides* L. Sp. Pl. ii. 1045 (1753), the type being *Clayton*, no. 601 from Virginia. A. photograph of the type, × ½, is reproduced as PLATE 761, FIG. 1, with an enlargement (FIG. 2) of spikelets, × 3, showing the characteristic flattened and twisted awn and the copious long coma. *Erianthus giganteus* Muhl. Cat. (1813), based directly upon it, has nothing to do with *E. giganteus* (Walt.) F. T. Hubbard; and the latter, a valid combination when published, must give way to E. SACCHAROIDES Michx. As to the definition by Muhlenberg of a plant he subsequently called *Erianthus giganteus*, that simply confirms his identification of it with *Andropogon alopecuroides* L., for he emphasized the twisted awn. I cannot follow the reasoning by which *E. giganteus* was taken up by Hitchcock in his Manual as *E. giganteus* "(Walt.) Muhl." In 1908 he was apparently right when he wrote of *Anthoxanthum giganteum* Walt. "The specific name can not be taken up because there is an *Erianthus giganteus* Muhl., based upon *Andropogon alopecuroides* L."—Hitchc. in Contrib. U. S. Nat. Herb. xii[3]. 151 (1908).

Although Nash in N. Am. Fl. xvii[1]. 94 (1909) reduced to *Erianthus saccharoides* Michx. his own *E. compactus* Nash in Bull. Torr. Bot. Cl. xxii. 419 (1895) and although Hitchcock, Man. also reduces it to the ill-fated *E. giganteus*, it seems to me a very well defined variety. Typical *E. saccharoides*, as shown by a photograph of the type before me, has the excessively hairy panicle 2–6 dm. long, the long beard of the spikelet 2 or 3 times as long as the blades of the glumes. It occurs from Florida to Texas, north to southeastern Virginia. Typical *E. compactus* has the panicle only 1–2 dm. long and the beard from slightly longer than to barely twice the length of the blades of the glumes. It occurs from the Carolinas and Alabama northward to southeastern New York, New Jersey, eastern Pennsylvania, the District of Columbia, northern Virginia and Kentucky, in the southern part of its range working back to the Appalachian

Mountains. Throughout the region where it is beyond the range of *E. saccharoides* it is readily recognizable and quite distinct, but a large proportion of specimens before me from South Carolina show a mixture of the two trends (panicles up to 3.5 dm. long but with short coma, the blades of the glumes thus very evident in the panicle as contrasted with the hidden blades in typical *E. saccharoides*) while some specimens from Georgia lie between *E. saccharoides* and *E. compactus;* so that I am forced to consider *E. compactus* an essentially northern and inland variety rather than a true species:

E. SACCHAROIDES Michx., var. **compactus** (Nash), comb. nov. *E. compactus* Nash in Bull. Torr. Bot. Cl. xxii. 419 (1895).

It is, unhappily, necessary to discuss the type of *Andropogon divaricatum* L. Sp. Pl. i. 1045 (1753). This species has been made by Hitchcock and by Nash identical with *A. alopecuroides* L. l. c. (1753) and in 1908 Hitchcock took it up, apparently because of priority on the page, to replace *E. alopecuroides* (L.) Ell. (1816), saying

> **Andropogon divaricatum** L. Sp. Pl. 1045. 1753.
>
> The type specimen is marked "2 divaricatum" and is from Gronovius. As pointed out elsewhere [b] [[b] Bot. Gaz. **35:** 215. 1903], this is the same as *A. alopecuroides* L., which is an Erianthus. It should be called **Erianthus divaricatus** (L.) instead of *Erianthus alopecuroides* (L.) Ell. Linnaeus also cites a synonym from Gronovius which is based on Clayton no. 600. This is *Sorghastrum linnaeanum* (Hack.) Nash.—Hitchc. in Contrib. U. S. Nat. Herb. xii[3]. 125 (1908).

My faith in the acumen of Linnaeus is such that I do not expect to find him describing identical species twice on the same page, although such accidents did happen. The diagnosis in 1753 of *Andropogon alopecuroides* was "4. ANDROPOGON panicula laxa, aristis tortuosis". That was all except literary citations, which, since Linnaeus had a specimen (our PLATE 761, FIGS. 1 and 2) matching the diagnosis, are wholly secondary. Similarly *A. nutans* L., type of *Sorghastrum nutans* (L.) Nash, had a "panicula nutante" and our familiar *Andropogon virginicum* was described "paniculae spicis conjugatis" &c. All these accounts (except of *Andropogon nutans* L.) are borne out by photographs of the types before me. *Andropogon divaricatum* did not have a panicle. Instead it was clearly defined: "2. ANDROPOGON spica oblonga, floribus lanatis remotis divaricatis: arista flexuosa

nuda"; and the specimen in Linnaeus's Herbarium (PLATE 761, FIGS. 3 and 4) when he prepared his diagnosis, therefore the TYPE, coincides most accurately with the brief but clear account. What it is I do not know. It was misidentified by Linnaeus with a plant of Clayton's from Virginia, "Lagurus humilior, panicula conica laxa nutante culmum terminante", a plant which Hitchcock says is the same as 3. *A. nutans* L. (*Sorghastrum nutans*). It would be most extraordinary if Linnaeus confused specimens of his nos. 2 and 3 and if Gronovius and Clayton before him treated as two different species from Virginia material of only one, *A. nutans*, while they did not recognize the conspicuously different *Sorghastrum Elliottii* (Mohr) Nash, which is frequent in eastern Virginia.

According to Hitchcock's statement in 1908, "Linnaeus also cites a synonym from Gronovius which is based on Clayton no. 600. This is *Sorghastrum linnaeanum* (Hack.) Nash"—Hitchc. in Contrib. U. S. Nat. Herb. xii³. 125 (1908); and he subsequently (Man. 951) states that *S. Linnaeanum* (Hack.) Nash, going back to *Sorghum nutans*, subsp. *Linnaeanum* Hackel in Martius, Fl. Bras. ii³. 276 (1883), was "misapplied" by Nash "to *S. Elliottii* (Mohr) Nash". Most unfortunately, here, as in so many cases already discussed, error seems to have crept in. Clayton's no. 600, basis of the Gronovian reference given by Linnaeus under *Andropogon divaricatum*, is beautifully preserved material, for a photograph of which (our PLATE 761, FIG. 5) I am indebted to Dr. Ramsbottom. It is, indeed, the best sort of *Sorghastrum Linnaeanum*, i. e. *S. Elliottii;* and my faith in the acuteness of Clayton, Gronovius and Linnaeus is justified. To be sure, Hitchcock reduced *S. Linnaeanum* to *S. nutans* (L.) Nash; but it seems improbable that he could have read Hackel's original diagnosis:

Panicula laxa, 25 cm. lg., nutans, oblonga, ramulis longioribus apice bispiculatis. Spiculae intense rufae, 6 mm. lg.; gluma prima ad medium parce pilosa, secunda glabra. Arista 23–25 mm. lg., columna subulam aequans, medio interum geniculata.

Andropogon nutans L. Spec. ed. 1. II. 1045 (non Mant. II); Ell. Sketch. I. 141.

Sorghum nutans Chapm. l. c.

America borealis: Florida, Georgia — Texas.

The clear description by Hackel is very close to Hitchcock's

account of *Sorghastrum Elliottii*, with "panicle loose, 15 to 30 cm. long, nodding at apex, the filiform branchlets and pedicels flexuous . . . ; spikelets 6 to 7 mm. long, chestnut-brown at maturity, . . . first glume hirsute or glabresecnt on the back; awn 2.5–3.5 cm. long, twice-geniculate". This strongly contrasts with the account of the plant Hitchcock calls *S. nutans*, with "panicle . . . yellowish, rather dense, contracted . . . at maturity . . . ; awn 1–1.5 cm. long, once-geniculate".

Returning to the actual *Andropogon divaricatum* L., the simple fact remains that its TYPE does not have a panicle. The photograph of it, kindly sent me by Mr. S. Savage (our PLATE 761, FIGS. 3 and 4), shows the summit of a culm with an oblong spike, the spikelets lanate, remote and divergent, the flexuous awn naked (spica oblonga, floribus lanatis remotis divaricatis: arista flexuosa nuda—*Linnaeus*). That it is not *Erianthus alopecuroides* (our PLATE 761, FIGS. 1 and 2) or any member of that genus is obvious. I have tried in vain to place it with anything Virginian or eastern American. The truncated pedicels of some of the spikelets suggest *Andropogon*, as does the spiraling awn; but no *Andropogon* which I know. It is not impossible that its source was far from Virginia. The photograph, poor as it is and showing the spikelets heavily impregnated with glue, may lead to its proper identification. It should be noted that the long-exserted peduncle is quite naked, with a prolonged and divergent blade at base. All eastern American species of *Andropogon* which have to be considered have close sheaths with appressed-ascending tips extending nearly or quite to the inflorescence. It should further be noted that one spikelet (FIG. 4) bears 2 or 3 spiraling awns, suggestive of *Danthonia*, but not of that genus. It is hoped that those who know the grasses will clarify the identity.

As to the type of *Andropogon nutans* L. I have no satisfactory information. The panicle of the wide-ranging species with short awns and pale spikelets is not nodding (*nutans*); but there is no doubt that the plants of Elliott, basis of *S. Elliottii*, and of Chapman were the latter very definite species. Since the identities of types throughout the group have been so discouragingly misunderstood, it is not at all improbable that the type of *A.*

nutans, when critically compared, may lead to some alterations of our ideas. At least, it is probable that somewhere amongst the many names placed by Hitchcock in the reputed synonymy of his *S. nutans* others may be found earlier than *Chrysopogon Elliottii* Mohr (1897).

From the situation in *Erianthus* and in *Muhlenbergia* (see pt. I) it is evident that the TYPES of our eastern North American grasses need much further and closer study.

PLATE 758. ERIANTHUS COARCTATUS Fern.: FIG. 1, TYPE, × ⅖; FIG. 2, panicle, × 1; FIG. 3, summit of rachis of raceme, × 3; FIG. 4, spikelet, × 3; FIG. 5, spikelet, × 6.

PLATE 759. E. BREVIBARBIS Michx., kindness of Professor *Humbert:* FIG. 1, TYPE, × ½; FIG. 2, spikelets of TYPE, × 1½; FIG. 3, spikelet, × 6, from *Demaree*, no. 8228.

PLATE 760. E. BREVIBARBIS Michx.: FIG. 1, plant, × ½, from Pulaski County, Arkansas, *Demaree*, no. 8228; FIG. 2, summit of rachis of raceme, × 3, from no. 8228; FIG. 3, spikelet, × 3, from no. 8228.

PLATE 761. FIG. 1, TYPE of ANDROPOGON ALOPECUROIDES L. and of ERIANTHUS ALOPECUROIDES (L.) Ell., × ½, kindness of Dr. *John Ramsbottom;* FIG. 2, spikelets of same, × 3, to show twisted awns. FIG. 3, TYPE of ANDROPOGON DIVARICATUM L. and of ERIANTHUS DIVARICATUS (L.) Hitchc., × ⅗, kindness of Mr. *S. Savage;* FIG. 4, summit of inflorescence, × 2. FIG. 5, *Clayton*, no. 600, paratype of A. DIVARICATUM, i. e. SORGHASTRUM ELLIOTTII (Mohr) Nash, × ½, kindness of Dr. *Ramsbottom*.

IV. WHY NOT ANDROPOGON GERARDI?

As early as 1700 the common plant of eastern North America, known either as *Andropogon provincialis* Lam. Encycl. i. 376 (1785) or as *A. furcatus* Muhl. ex Willd. Sp. Pl. iv. 919 (1806), was cultivated and perhaps escaped in Provence, in southern France. Tournefort, Inst. i. 521 (1700) had it as his *Gramen dactylon*, villosum, ramosum, altissimum, Gallo-Provinciale; but it was not until 1761 that the cultivated plant of Provence was beautifully described and illustrated by a figure as *Andropogon spica digitatis, flosculis alternatim geminis, hermaphrodito aristato, sessili; masculo mutico, pedunculato* by Gérard in his Flora Gallo-Provincialis, 106 (fig. 4) and 107 (1761), a plant which grew in southern Provence (*Oritur in gallopr. australi.* Perenne). Gérard's description was so detailed and so lucid that it is here given in full:

Des. *Radix numerosâ fibrarum multifariam implicatarum prole luxurians. Culmi tripedales & ultrà, glabri, striati. Folia radicalia multa, lata, glabra, cespites constituentia; caulina quinque vel sex, admodùm vaginantia, inferne ad margines pilis raris vestita. Membrana ex apice vaginarum*

brevis, lacinulata, sub villosa. Spicae ex apice culmi plures, digitatae, inaequales. Flosculi ex quolibet pedunculi dente gemini, basi villosi; hermaphroditus sessilis, triangularis, calyce unifloro, bivalvi, valvulis aequalibus, corollâ longioribus, exteriori muticâ longiore, interiori breviore, bifidâ, aristatâ, aristâ ex apice divaricationis prodeunte, recurvâ, flosculo longiore. Filamenta tria, breviora, antherae croceae, nutantes, styli duo, stigmata plumosa, purpurascentia; semen ovatum. Masculus pedicellatus, pedicello plumoso, anguloso; glumâ calycinâ exterior, interiori paulò longior, corollae glumae inaequales, muticae, calyce breviores. Filamenta ut in hermaphrodito, pistillum abortiens.

Obs. *Variat calycibus glabris, & villosis.*

In his Encyclopédie méthodique, i. 376 (August, 1785) Lamarck published it as *Andropogon provinciale* from the Royal Garden at Paris, merely copying the diagnoses of Gérard and of Tournefort, and adding, in French, a brief interpretation, ending: "On trouve cette plante dans la Provence, & on la cultive au Jardin du Roi." Seven years later the plant of Gérard received another binomial, *A. Gerardi* Vitman, Summa Pl. vi. 16 (1792), Vitman copying Gérard's diagnosis and citing both that and the illustration, the plant occurring "*In Gallo provincia*". Then in 1806 the wide-ranging North American plant appeared as *A. furcatus* Muhl. ex Willd. Sp. Pl. iv. 919 (1806). That *A. provincialis* Lam. is the same species as *A. furcatus* Muhl. there seems no doubt. Franchet in Bull. Soc. Bot. France, xxxi. 350–352 (1884) gave a very detailed history of the plant in France and he concluded the study: "La plante figurée et décrite par Gérard et cultivée au Jardin du Roi dès 1763, plante qui est certainement le type de l'*A. provincialis* Lamk, comme en font foi les exemplaires desséchés à cette époque et qui se trouvent dans l'herbier du Museum, est une espèce américaine, nommée quarante-deux ans plus tard *A. furcatus* Muehl. in Willd. *Sp.* IV, 919 (1805 [1806]). L'*A. provincialis* doît donc être rayé de la flore française." That it has, consequently, been "struck out from the French flora" is indicated by Rouy, Fl. Fr. xiv. 21 (1913), where he states in a note that "l'**A. Provincialis** Lamk . . . . = *A. furcatus* Mühlenb. . . . qui n'a existé en France que naturalisée et cultivée." Hackel, in his great and comprehensive monograph of the *Andropogoneae* in DC. Mon. Phan. vi. 441 (1889), had no doubt about the matter, definitely citing in the synonymy of *A. provincialis* both *A. Gerardi* and *A. furcatus*.

As it proves, unfortunately, the name *Andropogon provincialis* Lam. (1785), the name used by Hackel, by Nash in N. Am. Fl. and by many others, is clearly antedated by another *A. provincialis* Retz. Obs. Bot. iii. 43 (1783), a low annual, with 15 or 16 fascicled spikes, unequal subulate glumes, etc., obviously not Lamarck's species.[1] There is, however, little support for Hitchcock's doubt as to the identity of *A. provincialis* nor for his perplexity in settling which was earlier, Retz., l. c. or Lam. l. c. Hitchcock's statement is as follows:

> The name *Andropogon provincialis* Lam. (Encycl. i. 376. 1783), was applied to this species by Hackel (in DC., Monogr. Phan. 6: 441. 1889) and others, but Lamarck's species is uncertain. He states that he saw a plant in the Paris Botanical Garden, but his description is taken from Gerard (Fl. Gall. Prov. 107. pl. 4. 1761) and does not well apply to our species. Furthermore, *A. provincialis* Retz. (Obs. Bot. 3: 43. [31]. 1783), which appears to be a species of *Chloris*, was published the same year. The author is unable to determine which is the earlier. The part of Lamarck's Encyclodedie containing page 376 appeared in August 1783.—Hitchc. Man. 790 (1935).[2]

Hitchcock does not state *why* Gérard's "description . . . does not well apply to our species." Franchet and Hackel, both accurate students of grasses, felt positive of the identity; and perusal of Gérard's description side by side with Hitchcock's (Man.) shows nothing specifically distinctive. Any one can readily make the comparison. He is likely to arrive at the conclusion of Franchet, Hackel, Ascherson & Graebner, Rouy and others. As to Hitchcock's inability "to determine which is the earlier [Retz. Obs. Bot. iii. or Lam. Encycl. i. 376]", he was apparently relying on his own conclusion that "The part of Lamarck's Encyclopedie containing page 376 appeared in August 1783". It is too bad that the latter error in date confused the question for, as indicated by Sherborn and Woodward in Journ. Bot. xliv. 319 (1906), the part including p. 376 was published in August, 1785 (not 1783).

[1] Hackel (1889) placed it in *Chloris*.

[2] Hitchcock's inference that the plant, formerly cultivated in France, is "not . . . our species" may have arisen form Hackel's treating it as subvar. *genuinus*, with "spiculae . . . pedicellatae basi fasciculo pilorum manifesto 1,5 mm. longo barbatae" while his subvar. *furcatus* was "ut precedens, sed spiculae pedicellatae basi glabrae v. obsolete barbulatae." It is a very exceptional plant of eastern North America which lacks the bearding at the base of the pedicelled spikelet or at the summit of the pedicel. The distinctive point stated by Hackel is of no importance.

Since *Andropogon Gerardi* Vitman (1792) is the same as *A. provincialis* Lam. (1785) and *A. furcatus* Muhl. (1806), that appears to be the proper name for our common species. The following are the most marked varieties:

A. GERARDI Vitman, var. **paucipilus** (Nash), comb. nov. *A. paucipilus* Nash in Britt. Man. 70 (1901). *A. provincialis* Lam., var. *paucipilus* (Nash) Fern. & Grisc. in RHODORA, XXXVII. 147 (1935).

A. GERARDI, var. **chrysocomus** (Nash), comb. nov. *A. chrysocomus* Nash, l. c. (1901). *A. provincialis*, var. *chrysocomus* (Nash) Fern. & Grisc. l. c. (1935).

(*To be continued*)

V. STUDIES IN NORTH AMERICAN SPECIES OF SCIRPUS

(Plates 762–767)

THE AMERICAN REPRESENTATIVE OF SCIRPUS PUMILUS (PLATES 762–764).—One of the rarest or most localized sedges of North America is the tiny plant with solitary terminal spikelet, belonging in *Scirpus*, § *Baeothryon* and passing for nearly forty years in America as the Eurasian *S. alpinus* Schleicher (1828) and subsequently as the identical *S. pumilus* Vahl (1806). First recorded as American by Britton in Trans. N. Y. Acad. Sci. xi. 75 (1892) as *S. alpinus* from the "Rocky Mountains", *Hall & Harbour*, and from Moreley in the Canadian Rocky Mountains, the species next attracted attention from its discovery on Anticosti Island and the adjacent Mingan Islands of Saguenay County, Quebec, and was the subject of one of the interesting articles by Marie-Victorin, in Trans. Roy. Soc. Can., ser. 3, xxiii. pt. 2, sect. V. 25 (1929). Somewhat later, in RHODORA, xxxiii. 23, 24 (1931), I pointed out that the name *S. pumilus* Vahl antedates *S. alpinus* Schleicher and I then recorded additional stations in the Canadian Rocky Mountains; and more recently Beetle, in Am. Journ. Bot. xxviii. 421 (1941), has maintained *S. pumilus* as American: "Mountain meadows of Eurasia and North America", he citing American plants of Quebec (Anticosti and the Mingan Islands), Saskatoon, Saskatchewan, Alberta and Colorado. The habitat, "mountain meadows", while perhaps applying in the Rocky Mountains, is hardly appropriate for the Quebec area, with Anticosti rarely attaining a height of 175 m.[1] and the Mingan

[1] "les plus hautes plateaux cités par eux ne dépassent pas 150 et 175 metres"—Despêcher and Combes as quoted by Schmidt, Monographie de l'Ile d'Anticosti, 10 (1904).

Another member of § *Baeothryon*, the flat-leaved woodland *Scirpus planifolius* Muhl., is cited by Beetle, l. c. 174, from "VERMONT: Willoughby, *W. Boott* in 1863". William Boott's herbarium is incorporated in the Gray Herbarium. There is there no Vermont material of *S. planifolius* from him, and Kennedy and others who intimately knew the Willoughby region did not know it there. Dole lists it only from

Islands still lower, while Saskatoon is well to the east of the mountains, in the flat Canadian prairie.

Ever since Britton's identification of the Rocky Mountain plant with *S. alpinus* Schleicher or *S. pumilus* Vahl of central and southeastern Europe, eastward into Persia and central Asia, we have accepted the identification without question. The plants of Eurasia are at least two quite different species, or perhaps geographic varieties, while some of the Asiatic material, that of alpine regions (4305–5200 m.) of Tibet may be distinct. This Tibetan plant may well be *Isolepis oligantha* C. A. Meyer, Mém. des Sav. Étrang. Pétersb. i. 197, t. 1 (1831); but until some one who has more adequate material and who can study Meyer's Siberian type can check it, the Tibetan plant may wait.

True *Scirpus pumilus* of the alpine regions of south-central and -eastern Europe, thence into Persia and Siberia (our PLATE 762) is subcespitose or quite densely cespitose (as shown by Reichenbach and others), with short stoloniferous offsets which promptly send up erect tufts of culms; the lowest scale of the spikelet often has the green midrib prolonged (FIGS. 3 and 4) as a green and blunt mucro; the anthers (FIGS. 2 and 3) have the connective prolonged as a distinct subulus; the achenes (FIGS. 6–8) are rather slenderly ellipsoid-obovoid, 1.6–1.8 mm. long, 0.4–0.5 mm. broad, subequilaterally trigonous (FIGS. 6 and 9) and usually broadly rounded to truncate at the sessile base; while all but the lowermost scales of the spikelet have thin scarious margins.

Fully 2100 km. to the north, within the Arctic Circle, there is a plant, occurring on Porsanger Fjord (south of Cape North) in northernmost Norway which is identified in current Scandinavian floras as *Scirpus pumilus*. This plant (PLATE 763, FIGS. 1–5) is extensively creeping, with very elongate filiform rhizomes and with small and scattered tufts of culms. Its anthers (FIG. 2) and achenes (FIG. 4) are like those of *S. pumilus*, except that the achenes are longer (2–2.2 mm. long); but its scales are much

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two Vermont stations, Mt. Philo (Addison County) and North Pownal (Bennington County). It has also been collected in Arlington, Bennington County. These known stations are along the warm southwestern border of Vermont, not, like Willoughby, near the northeastern corner. It is probable that the Willoughby record of *S. planifolius* arose from *S. pauciflorus* Lightf., now usually treated as *Eleocharis pauciflora* (Lightf.) Link (var. *Fernaldii* Svenson) which abounds at Willoughby and was there collected by Wm. Boott in 1863.

firmer and broader than in true *S. pumilus* and the latter have the margins hardly if at all scarious (FIG. 3). Furthermore the lowest scale (FIG. 2) is nearly like the others, without the green mucro strongly excurrent. Differing so markedly from typical *S. pumilus*, it was beautifully described as *Trichophorum emergens* Norman in Soc. Reg. Sc. Norveg. v. 319—repr. as Spec. Loc. Nat. 79 (1868)—and as abundant on the sandy inundated shore in Porsangria. "Vaginae basilares culmi ut in *Trichophoro caespitoso*, a quo rhizomate repente, stolonifero, fasciculos pauciculmeos immo culmos solitarios huc illuc emittente, recedit. Sub accessu maris inundatur, sub recessu emergit". So different is this Finmark plant of inundated tidal shores from the more cespitose one of the southern alpine areas that it should certainly be kept apart.[1] Even the original editors of *Index Kewensis*, who did not hesitate to reduce species they did not understand, were baffled by *Trichophorum emergens*, appending after the citation "(Quid?)—Norveg."

As stated and as shown in the plates, the anthers in the Eurasian *Scirpus pumilus* and *S. emergens* have prominently excurrent connectives and the achenes are subequilaterally trigonous, while in *S. pumilus* the lowest scale often has the midrib excurrent as a mucro; and the blunt scales of the arctic tidal-shore *S. emergens* are subcoriaceous and scarcely scarious-margined. When we turn to the North American plant (PLATE 764) which has passed as *S. pumilus* we find a habit midway between those of the two European species, the culms tufted, sometimes without but usually with slender and elongate rhizomes and scaly stolons. The American plant on superficial examination might easily be thought to stand somewhat intermediate between those of Eurasia. In our plant the scales of the spikelet are as thin as in *S. pumilus* but the lowest (FIGS. 2 and 3) has the midrib included, not exserted; the anthers (FIGS. 2 and 4) merely taper to tip, with the connective not exserted; and the achene (FIGS. 5–10) is plano-convex, broad and flat on the inner face, gently arching to merely umbonate on the back. The ripe achenes (FIGS. 5–7) are broadly ellipsoid-oblong, only 1.2–1.5 mm. long but 0.8–1.2 mm. broad, and gradually rounded to

[1] **SCIRPUS emergens** (Norman), comb. nov. *Trichophorum emergens* Norman in Soc. Reg. Sc. Norveg. v. 319—repr. as Spec. Loc. Nat. 79 (1868). PLATE 763, figs. 1–5.

base or sometimes substipitate. Differing in these minute but morphologically important characters from the Eurasian series, the North American plant is clearly an endemic species. Our fullest representation is the abundant series from Anticosti and the Mingan Islands, collected by Bros. Marie-Victorin and Rolland-Germain. I am greatly pleased to have this opportunity to associate with a plant of that area the name of a modest and self-effacing botanist who has done much in his earnest and discriminating way to bring to our knowledge the rarer plants of Quebec, Brother Rolland-Germain.

SCIRPUS (§ BAEOTHRYON) **Rollandii,** sp. nov. (TAB. 764). Planta habitu foliis culmisque ut in *Scirpo pumilo* sed valde stolonifera; culmis laxe cespitosis vel subsolitariis; spiculis ellipsoideo-ovoideis 3–4 mm. longis, subteretibus; squamis ovatis obtusis vel subacutis brunneis vel rufescentibus subcoriaceis margine scariosis; antheris 1.5 mm. longis apice attenuatis; achaeniis nigrescentibus late oblongo-ellipticis, 1.2–1.5 mm. longis 0.8–1.2 mm. latis, plano-convexis dorso leviter convexo vel umbinato.—QUEBEC: Archipel de Mingan: rivages calcaires, Ile Sainte-Geneviève, 9 août, 1925, *Victorin & Rolland*, no. 20,220; corniches calcaires du côté du large, Ile Sainte-Geneviève, 22 juillet, 1926, *Victorin & Rolland*, no. 25,785 (TYPE in Herb. Gray.); rivages calcaires, Ile à Marteau, 23 juillet, 1926, *Victorin & Rolland*, no. 25,940; parties élevées et découvertes surtout dans les sentiers de renard, Grande Ile à la Vache Marine, 19 juillet, 1926; *Victorin & Rolland*, no. 25,782; tundra calcaire parmi les Ericacées et les *Salix* nains, Grande Ile à la Vache Marine, 3 août, 1928, *Victorin & Rolland*, no. 28,374. Anticosti: sur les platières argilo-calcaires au-dessus des gorges, Rivière Chicotte, 15 août, 1925, *Victorin & Rolland*, no. 25,783; sur les platières à plusieurs milles en haut des gorges, Rivière Chicotte, 24 juillet, 1927, *Victorin & Rolland*, no. 27,517; sur les platières avec divers *Antennaria*, 19 août, 1926, *Victorin & Rolland*, no. 25,784; sur les platières en haut des gorges, Rivière au Fusil, 20 juillet, 1927, *Victorin & Rolland*, no. 27,518; sur les platières près de la mer, 25 juillet, 1927, *Victorin & Rolland*, no. 27,516; éboulis argilo-calcaire, le long de la mer, à l'est de la rivière, Rivière la Loutre, 6 août, 1926, *Victorin & Rolland*, no. 25,781. SASKATCHEWAN: depressed alkaline bog, Sutherland, Saskatoon, June 1, 1938, and July 24, 1939, *W. P. Fraser*. ALBERTA: marsh, Devil's Lake, alt. 4600 ft., Banff, July 5, 1907, *Butters & Holway*, no. 50. COLORADO: "Rocky Mt. Alpine Flora, Lat. 39°–41°", 1862, *Hall & Harbour*, no. 583.

PLATE 762 shows details of SCIRPUS PUMILUS Vahl: FIG. 1, habit, × 1, from Prov. Semipalavitinsk, western Siberia, May 21, 1920, *O. Simonova* &

T. Batueva; FIG. 2, spikelet, × 10, from same collection; FIG. 3, spikelet, × 10, from Mont Cenis, Savoie, July 27, 1855, *Perrier;* FIG. 4, spikelet, × 10, from *Simonova & Batueva;* FIG. 5, disintegrated spikelet, showing broad scarious margin of scale, × 10, from Zermatt, July, 1882, *Christ;* FIG. 6, achene and its cross-section, after *Schroeter*, Pflanzenl. der Alpen, fig. 174 (1923); FIG. 7, achene, × 10, from Mont Cenis, *Perrier;* FIG. 8, achene, × 10, from Zermatt, *Christ;* FIG. 9, looking down on summit of achene, × 10, from Zermatt, *Christ.*

PLATE 763, FIGS. 1–5. S. EMERGENS (Norman) Fernald: FIG. 1, habit, × 1, from Porsangar Fjord, Finmark, July 9, 1898, *A. L.;* FIG. 2, spikelet, × 10, from same collection; FIG. 3, disintegrated spikelet, showing firm scales, × 10, from Borself, Porsanger, August 15, 1899, *Ove Dahl;* FIG. 4, achene, × 10, from *Dahl;* FIG. 5, looking down on tip of achene, × 10, from *Dahl.* FIG. 6, *S. rufus* (Huds.) Schrad.: achenes, × 10, from Skåne, Sweden, July 14, 1928, *Erik Asplund.* FIG. 7, *S. rufus,* var. *neogaeus:* achenes, × 10, from the TYPE.

PLATE 764, S. ROLLANDII Fernald: FIG. 1, habit, × 1, from the TYPE; FIGS. 2 and 3, spikelets, × 10, from TYPE; FIG. 4, disintegrated spikelet, showing anthers, × 10, from TYPE; FIG. 5, achene, × 10, from Ile à la Vache Marine, Archipel de Mingan, Quebec, *Victorin & Rolland*, no. 28,374; FIG. 6, achene, × 10, from Rivière Chicotte, Anticosti, *Victorin & Rolland*, no. 27,517; FIG. 7, achene, × 10, from Saskatoon, Saskatchewan, July 24, 1939, *W. P. Fraser;* FIG. 8, looking down on tip of achene in fig. 5, × 10; FIG. 9, similar view, × 10, of achene in fig. 6; fig. 10, similar view, × 10, of achene in FIG. 7.

SOME NORTH AMERICAN MEMBERS OF SCIRPUS, § LACUSTRES (PLATES 765 and 766).—

SCIRPUS VALIDUS Vahl, var. **creber,** var. nov. (TAB. 765, FIG. 4–7), spiculis ovoideis 5–9 mm. longis; squamis costa margineque exceptis glabris lucidis achaenio maturo vix superantibus; antheris deinde subulato-appendiculatis; perianthio achaenium subaequante; achaeniis 1.7–2.5 mm. longis 1.3–1.5 mm. latis.—Newfoundland to British Columbia, south to Nova Scotia, New England, Long Island, Georgia, Tennessee, Missouri, Oklahoma, Texas, New Mexico, northern Mexico and California. TYPE: salt-marsh, Fisher's Island, New York, August 10–15, 1920, *Harold St. John*, no. 2581 (in Herb. Gray.).

Forma **megastachyus,** f. nov. (TAB. 765, FIG. 8), spiculis lineari-cylindricis 9–15 mm. longis; achaeniis 2.3–2.8 mm. longis 1.4–1.8 mm. latis.—Scattered through the range of var. *creber;* the following are characteristic. NOVA SCOTIA: Truro, *Fernald & Wiegand*, no. 2720. MAINE: Lincolnville, *G. B. Rossbach*, no. 238. MASSACHUSETTS: York Pond, Canton, July 8, 1894, *Kennedy;* Eastham, *F. S. Collins*, no. 1293; Wakeby Pond, Sandwich, September 16, 1916, *Harger & Woodward.* CONNECTICUT: East Windsor, August 21, 1904, *Bissell.* VIRGINIA: west of Toano, James City County, *R. W. Menzel*, no. 89. MICHIGAN: New Buffalo, *Lansing*, no. 3281. IOWA: Lost Lake Township, Clay County, *Ada Hayden*, no. 9195. NORTH DAKOTA: Mandan, *F. P. Metcalf*, no. 374. NEBRASKA: St. Paul, July 24, 1909, *J. M. Bates.* KANSAS: Joy Creek, Osborne County, July 11, 1894,

Shear, no. 239 (TYPE in Herb. Gray.); Riley Co., June 21, 1895, *J. B. Norton*. TEXAS: Dallas Co., July, 1877, *Reverchon;* El Paso County, *Cory*, no. 1255. ALBERTA: Cree (Mamawi) Creek, Wood Buffalo Park, *Raup*, no. 1980. OREGON: St. Paul, *J. C. Nelson*, no. 1692; Salem, *Nelson*, no. 3307.

Scirpus validus (PLATE 765, FIGS. 1–3) was described by Vahl, Enum. ii. 268 (1806), its "*Habitat* in Caribaeis", with a clear diagnosis and a remarkably complete description, he distinctly saying "squamis dorso villosis". It is the plant of eastern tropical America[1] which differs at once from the common plant of the United States and Canada in several points. Its inflorescence (FIG. 1) is usually stiffer than in the common North American plant, only exceptionally with arching and pendulous rays and pedicels, although the more northern plant may have the inflorescence as stiff as in *S. acutus* Muhl. Typical *S. validus* may, as originally described, have the scales of the spikelets villous or they may be glabrescent or even glabrous except for the keel and the fimbriate-ciliolate margin. In none of the tropical and subtropical American material do the achenes show beyond the scales; the scales strongly cover them and are nearly twice as long. The perianth consists of very delicate bristles remotely retrorse-setulose chiefly above the basal third and commonly overtopping the achene. The connective of the anther (FIGS. 2 and 3) projects as a triangular-ovate sessile tip, though sometimes becoming elongate. North of tropical America true *S. validus* is frequent or common in Florida and there is material in the Gray Herbarium with the stereotyped and possibly too inclusive label "Santee Canal, South Carolina, *Ravenel*".

From genuine tropical and subtropical *Scirpus validus* our var. *creber* differs in its often more lax inflorescence (FIGS. 4 and 5), the backs of the scales glabrous, the scales barely covering or when they are ripe (FIG. 5) not wholly covering the achenes; the perianth (FIG. 7) of usually coarser and rather shorter bristles which are copiously retrorse-setose; and the anther (FIG. 6) with the slender tip becoming prolonged. Some material from the southeastern states and some from Bermuda is so transitional

[1] The citation by Beetle in Am. Journ. Bot. xxviii. 695 (1941) of Bermuda, Haiti, Porto Rico, Jamaica and Cuba as the "EAST INDIES" and his statement of broad range (p. 693), "common throughout North America, and bordering the Pacific basin", with the only South American specimens cited coming from Uruguay and Argentina, suggest need of more precise knowledge of geography.

that I am treating the common plant of the United States and Canada as a strong geographic variety, rather than as a species. In its prolonged and linear-cylindric spikelets up to 1.5 cm. long var. *creber*, forma *megastachyus* (FIG. 8), when its inflorescence is contracted, might be mistaken for *S. acutus.* In fact, by the recently published key to species of this section ("Spikelets ovoid . . . *S. validus*"; "Spikelets subcylindric . . . *S. acutus*"[1] and the accompanying descriptions ("spikelets 5–10 mm. long, . . . ovate" for *S. validus;* "spikelets 0.7–2 cm. long, . . . ovate-acute to cylindrical" for *S. acutus*) one could hardly place most specimens under *S. validus;* nevertheless several specimens, including the type, of forma *megastachyus* were cited as good *S. validus.* Accompanying the elongation of spikelet the achene of forma *megastachyus* is enlarged, achenes from the form running considerably larger than in typical var. *creber.*

In connection with *Scirpus validus*, var. *creber* two names have to be considered, because they are cited by Beetle as synonyms under his all-inclusive *S. validus.* These are *S. orgyalis* Raf. Annals of Nature [not "Amer. Nat." as cited in the recent paper], 16 (1820) and *S. lacustris,* var. *condensatus* Peck, N. Y. State Mus. Rep. no. 53: 853 (1900). Rafinesque's *S. orgyalis* of "creeks and rivers of New York and Pennsylvania", had little of specific character in the brief description except "spikes lateral under the apex, glomerated, ovate, sub-sessile; scales ovate, mucronate, brown, arachnoidal". What he had we do not know. He intended his name to apply to anything North American of the *lacustris* group. The "glomerate . . . sub-sessile" spikes with "arachnoidal" scales could as well, if not better, apply to *S. acutus* Muhl. (1842) which occurs in New York and western Pennsylvania and which often has villous scales, while those of the *S. validus* of that region have the scales glabrous except for keel and margin.

Peck was not differentiating between the three species of § *Lacustris* which occur in New York State. His "**S. lacustris condensatus** *n. var.*" was described: "Heads of the panicles sessile or on very short pedicels, forming a dense cluster about 1 inch long and broad. Otherwise as in the common form. Lime

[1] Beetle, l. c. 692 (1941).

Lake. August. F. E. Fenno." According to House, N. Y. State Mus. Bull. no. 254: 147 (1924) the Fenno plant is *S. heterochaetus*, a species which usually has a lax and open panicle and which differs from *S. validus* in its very pale and solitary spikelets, its trigonous achene, etc. Even if *S. lacustris condensatus* were an unusual form of *S. validus* it would be quite ridiculous to take up the name, intended for a trivial form, for the transcontinental plant with open and loosely forking panicles. Extreme literalists might do so, but the intent of the original author was obvious; the rules of nomenclature were not intended to foster absurdity, if they do, it is time to change them.

S. Steinmetzii, sp. nov. (TAB. 766, FIG. 1–7). Planta statura habituque ut in *Scirpo heterochaeto;* spiculis ellipsoideo-ovoideis obtusis 5–7.5 mm. longis 4–5 mm. crassis fulvis; squamis scarioso-membranaceis fulvis acuminatis glabris, margine apiceque villoso-ciliatis, aristo breve; antheris apice triangulari-ovatis; stylo 2-partito; achaeniis plano-convexis albescentibus elliptico-obovatis vel subrotundatis 2.5–2.8 mm. longis; setis 1 vel 2 vel 0 tenuissimis brevibus.—MAINE: bank and shore of sluggish stream, Passadumkeag Stream, Passadumkeag, Penobscot County, August 12, 1937, *F. H. Steinmetz,* no. 355 (TYPE in Herb. Gray.; ISOTYPE in Herb. Univ. of Maine), September 1, 1938, *Steinmetz,* July 29, 1942, *Steinmetz & Gashweiler*, specimens originally and tentatively placed with *S. heterochaetus* Chase; shallow water near shore of river, Passadumkeag River at Hathaway Bridge, Passadumkeag, August 5, 1940, *Ogden & Wright,* no. 2345.

Scirpus Steinmetzii, with which it is a great pleasure to associate the name of the leader of botanical exploration in Maine and discoverer of the plant, is like *S. heterochaetus* only in having a prolonged basal leaf and in its lax inflorescence with no tendency to the formation of glomerules. *S. heterochaetus* has slender pale green to whitish-brown lanceolate to slenderly ellipsoid acute or subacuminate spikelets 0.75–2.3 cm. long; its pale scales are firm to subcoriaceous and deeply emarginate at tip; its styles mostly 3-cleft, its achenes trigonous. It is a species of calcareous or alkaline waters; and it was beautifully illustrated by Mrs. Chase when she published it in RHODORA, vi. 70, t. 53, fig. *d* (1904). *S. Steinmetzii*, on the other hand, has the reddish to purple-brown plump-ovoid obtuse spikelets only 5–7.5 mm. long; the thin and almost scarious scales tapering to the awn

(not deeply emarginate) and heavily villous-ciliate (rather than slightly or hardly so) at margin; the style is 2-cleft and the strongly flattened achene plano-convex, merely slightly convex on the back. It should, therefore, be confidently watched for in the extensive lake-strewn area which extends from the Penobscot across Hancock and Washington Counties, Maine, into southwestern New Brunswick.

From *Scirpus validus*, var. *creber* the newly described *S. Steinmetzii* is distinguished by its non-glomerulate spikelets, the scales greatly overtopping the achenes (as in tropical *S. validus*), but with tapering (rather than broadly rounded and emarginate) tip, the anther-connective with a triangular sessile terminal appendage, the bristles fewer and short or wanting, and the persistent old filaments very broad and ribbon-like.

In PLATE 765, FIGS. 1–3 are of typical SCIRPUS VALIDUS from Cordillera Septentrional, prov. Puerto Plata, Sabaneta, in Caño Hondo, Civ. Santo Domingo, Hispaniola, *Ekman*, no. 14,549: FIG. 1, inflorescence, × 1; FIG. 2, spikelet, showing blunt anther, × 5; FIG. 3, achene, showing elongate bristles and an anther, × 10. FIGS. 4–7, var. CREBER: FIG. 4, inflorescence of TYPE, × 1; FIG. 5, mature spikelets, showing protruding achenes, × 5, from Litchfield, New York, *Haberer*, no. 2228; FIG. 6, flowering spikelets, showing apiculate anthers, × 5, from Dixville Notch, New Hampshire, July 27, 1895, *E. F. Williams;* FIG. 7, achene, showing bristles, from TYPE, × 10. FIG. 8, inflorescence of TYPE of var. CREBER, forma MEGASTACHYUS, × 1.

In PLATE 766 FIGS. 1–7 are of SCIRPUS STEINMETZII, all from the TYPE series: *fig.* 1, inflorescences, × 1; FIG. 2, axis of inflorescence, × 3; FIGS. 3 and 4, spikelets, showing long scales and blunt anthers, × 5; FIGS. 5 and 6, achenes, with single perianth-bristle and broad filaments, × 10; FIG. 7, achene viewed from above (looking down on beak), × 10. FIGS. 8–10, S. HETEROCHAETUS, from Selkirk, Oswego County, New York, *Fernald, Wiegand & Eames*, no. 14,192: FIG. 8, spikelets, × 5; FIG. 9, achene, × 10; FIG. 10, achene, viewed from above, × 10.

SOME AMERICAN SPECIES AND VARIETIES OF SCIRPUS (PLATES 763, figs. 6 and 7, and 767).—SCIRPUS RUFUS (Huds.) Schrad., var. **neogaeus,** var. nov. (TAB. 763, FIG. 7), achaeniis fusiformi-lanceolatis 4.5–5.5 mm. longis 1–1.7 mm. latis valde stipitatis rostratisque.—Saline to brackish, rarely fresh marshes, Newfoundland and shores of Gulf of and lower River St. Lawrence, Quebec, south to southwestern Nova Scotia and southwestern New Brunswick; salt marshes from Churchill to Red Deer River, lat. 53°, Manitoba. TYPE: near Hospital Point, Grindstone Island, Magdalen Islands, July 18, 1912, *Fernald, Bartram, Long and St. John*, no. 6968 (in Herb. Gray.).

In habit, foliage, spikes and spikelets the American material of *Scirpus rufus* (*Blysmus rufus* (Huds.) Link) is quite like the plant of northern Europe and it shows the same diversity of

involucre, oftenest with it essentially obsolete or reduced to a short blade but occasionally with a long blade overtopping the compound spike. The European descriptions very generally define the achene as elliptic and of a yellow-gray color. There being no reason in European works for further detail the size is not often given. Holmberg, however, in his very detailed and unfortunately never completed Scandinaviens Flora, Häfte 2: 304 (1926) says "*Nöt* spolformigt [fusiform] elliptick . . 3 mm. läng, 1,5 mm. bred, gul-1. brungrå." The achenes of the European plant (PLATE 763, FIG. 6) range from 3–4.5 mm. long, with the rather definitely elliptic body usually about 3 mm. long and 1.5–2 mm. broad and opaque to barely sublustrous. The achene of the American plant is more definitely fusiform, 4.5–5.5 mm. long, lustrous and of slightly warmer color, the body only 1–1.7 mm. broad, the stipe and beak more prolonged than in the European plant. FIG. 6 shows achenes, × 5, of typical *S. rufus* from Skäne, Sweden, July 14, 1928, *Erik Asplund;* FIG. 7, achenes, × 5, from the TYPE of var. *neogaeus*.

S. SUBTERMINALIS Torr., forma **terrestris** (Paine), comb. nov. Var. *terrestris* Paine, Cat. Pl. Oneida Co., 96 (1865).

S. MARITIMUS L., var. FERNALDI (Bicknell) Beetle, forma **agonus,** culmis ad 1.5 m. altis et 1.3 cm. crassis; foliis ad 15 mm. latis; spiculis 1.2–4 cm. longis; achaeniis late vel subrotundo-obovatis ad basin sensim rotundatis plerumque 2.5–3.2 mm. latis plano-convexis vel lenticularibus dorso sensim rotundatis.—Saline or brackish marshes and fresh tidal shores, Cape Breton, Magdalen Islands, Prince Edward Island and eastern New Brunswick, south to Connecticut. The following belong here. QUEBEC: shallow water near margins of brackish ponds southwest of Étang du Nord village, Grindstone Island, Magdalen Islands, *Fernald, Long & St. John,* no. 6986. PRINCE EDWARD ISLAND: border of salt marsh, Mt. Stewart, *Fernald, Bartram, Long & St. John,* no. 6980; salt marsh, Bunbury, *Fernald, Long & St. John,* no. 6987. NOVA SCOTIA: salt marsh at head of Baddeck Bay, Victoria Co., *Fernald & Long,* no. 20,215; edge of brackish marsh, Sable Island, *St. John,* no. 1160; near brackish mouth of Salmon River, Truro, *Fernald & Wiegand,* nos. 4248 and 4249; border of salt marsh, Jordan Falls, Shelburne County, September 4, 1921, *Fernald & Long,* no. 23,398 (TYPE in Gray Herb., distrib. as *S. campestris,* var. *novae-angliae*). NEW BRUNSWICK: brackish marsh, Bathurst Bay, Bathurst, *S. F. Blake,* no. 5457; marsh, Bay du Vin Island, Northumberland County, *Blake,* nos. 5706 and 5707; border of brackish pond,

Whale Cove, Grand Manan Island, *C. A. & Una F. Weatherby*, no. 5609. MAINE: salt marsh toward Dennisville, Pembroke, *Fernald*, no. 1414; brackish shores, Pleasant River, Columbia Falls, *Svenson & Fassett*, no. 1005; muddy shore of Herrick's Bay, Flye's Point, Brooklin, *A. F. Hill*, no. 1345; fresh or slightly brackish border of salt marsh, South Thomaston, *Bissell, Fernald & Chamberlain*, no. 8933; wet rocky shore, Matinicus, July 19, 1919, *C. A. E. Long;* sandy salt marsh, Bristol, *E. B. Chamberlain*, no. 695, *Dinsmore & Chamberlain*, no. 839; salt marsh, Bath, August 23, 1911, *Bissell;* Foster's Point, West Bath, 1892, *Kate Furbish;* salt marsh, Hardings', Brunswick, September 13, 1891, *Kate Furbish*, September 27, 1898, *Chamberlain*, no. 936; Kennebunkport, August 7, 1888, *Kennedy;* mouth of York River, York, *Bicknell*, no. 1156, *Fernald & Long*, no. 12,845. NEW HAMPSHIRE: ditch near border of salt marsh, Hampton Falls, August, 1898, *A. A. Eaton*. MASSACHUSETTS: Manchester, *H. D. Thoreau;* salt marsh, West Manchester, *F. T. Hubbard*, no. 73; Somerville, 1882, *C. E. Perkins;* Watertown, July 17, 1880, *C. E. Perkins;* salt marsh, Scituate, September 8, 1901, *W. P. Rich*, September 13, 1914, *C. H. Knowlton;* swale, West Barnstable, *St. John & White*, no. 941. CONNECTICUT: salt marsh, Milford, *E. H. Eames*, no. 39.

Scirpus maritimus, var. *Fernaldi*, forma *agonus*, is the eastern North American plant treated by Beetle in Am. Journ. Bot. xxix. 84, 85 (1942) as typical *S. maritimus* of Europe. It is quite like *S. maritimus*, var. *Fernaldi* (Bicknell) Beetle, l. c. 85, except in having bifid styles and thin plano-convex to lenticular achenes. Throughout the range of var. *Fernaldi*, with trigonous achenes, and its forma *agonus* the two show the same range of variation in spikelets and habit, with a dense glomerule or more commonly with well developed rays, with the latter terminated by single to several and glomerulate spikelets, with the spikelets short and ovoid as in the type of *S. Fernaldi* Bickn. or slender and lance-cylindric, running up to 4 cm. or more long, as in the type of *S. novae-angliae* Britton. Both *S. Fernaldi* and *S. novae-angliae* were based upon specimens with trigonous achenes; and in that series as well as in the one with plano-convex or lenticular and relatively thin achenes there is no line of demarcation evident by which the plants with ovoid and lance-cylindric spikelets can be separated. *S. novae-angliae* was published as a species in 1898, *S. Fernaldi* in 1901. In the varietal rank they are of identical date, published in RHODORA, viii. 163 (1906) as *S.*

campestris, var. *novae-angliae* (Britton) Fern. and var. *Fernaldi* (Bicknell) Bartlett, but since the latter was transferred to *S. maritimus* as var. *Fernaldi* while Beetle considered *S. novae-angliae* to be a variety of *S. robustus* Pursh, *S. robustus*, var. *novae-angliae* (Britton) Beetle, l. c. 87 (1942), they are again of even date. Under these circnustances it seems less disturbing to maintain under *S. maritimus* the first of the two which was treated as a variety of that species.

It is not clear to me why Beetle places *Scirpus novae-angliae* under *S. robustus*. The latter species is a beautifully distinct one of tropical America, following the Atlantic coast northward to Massachusetts, the Pacific to California. Its plump ellipsoid-ovoid to thick-cylindric blunt or bluntish spikelets are rufescent or fulvous, the scales (especially the outer) with very prolonged awns. Its leaf-sheaths have very characteristic orifices, the strong ribs running up the summit to the semicircular or prominently convex dark scarious ligule. *S. novae-angliae*, on the other hand, like European *S. maritimus* and American *S. Fernaldi*, has the ligule V-shaped, with truncate or concave (rarely low-convex) summit and the nerves at the summit of the sheath are slender and relatively inconspicuous. The ovoid to lance-cylindric acute to acuminate spikelets are, as in *S. maritimus*, castaneous to fuscous or blackish, and the awns of the scales are relatively short.

From typical European *Scirpus maritimus*, our var. *Fernaldi* is distinguished merely on size, the leaves running higher on the culm, and upon a slight difference in shape of achene. Our plant is usually taller and coarser, with leaves mostly 6–15 mm. broad (as opposed to the "± 4 (7)"—*Hegi*, of the European); the spikelets of ours are 1.2–4 cm. long ("bis 2 cm. lang" in *S. maritimus*—*Hegi*); and the achenes are generally more broadly obovate and more gradually rounded to the broad base, as opposed to the narrower-obovate achene of *S. maritimus* in which they taper more cuneately or even with a slight concave curve to the slender base.

I do not know how Beetle arrived at the conclusion that true (Eurasian) *Scirpus maritimus* has "Style normally 2-fid" (Beetle, l. c. 87), for the consensus of statements of European taxonomists makes the 2-fid style very exceptional: "*a t y p i c u s*

. . . Narben 3"—*Ascherson & Graebner;* "Stigmates 3 (rar^{t} 2 . . .)"—*Rouy;* "Stigmas 3, or rarely 2"—*Babington;* "Style 3-cleft"—*Bentham;* "Narben 3, seltener 2"—*Hegi.* Although true *S. maritimus* (with 3 stigmas and trigonous achenes) is in Europe the common form, while the so-called var. *digynus* (Simonk.) Godr. is there called rare, with us typical var. *Fernaldi* (with trigonous achenes) and its forma *agonus* are about equally common. At least, in the area from the Gulf of St. Lawrence to Connecticut, where the two somewhat alternate their colonies, the representation before me shows 51 sheets of typical var. *Fernaldi* (including *S. novae-angliae*) and 58 of forma *agonus.* Within this area the two are about equally common; from New York to Virginia the representation before me is all of typical var. *Fernaldi.*

S. PALUDOSUS Nels., var. **atlanticus,** var. nov., a forma typica recedit foliis caulinis plerumque 2–4, sub medio gestis, vaginae venis apice tenuibus vix prominulis; spiculis brunneo-castaneis vel fusco-nigrescentibus; antheris plerumque 2–3.5 mm. longis, filamentis inclusis vel subexsertis; achaeniis rotundo-obovatis vel suborbicularibus rariter cuneatis olivaceis vel atro-brunneis.—Salt marshes and saline shores, Gulf of and lower River St. Lawrence, Quebec, to northern New Jersey; central and western New York. TYPE: salt marsh, Bunbury, Prince Edward Island, August 28, 1912, *Fernald, Long & St. John,* no. 6982 (in Herb. Gray.).

Scirpus paludosus Nels. in Bull. Torr. Bot. Cl. xxvi. 5 (1899), like the identical *S. campestris* Britton in Britt. & Brown, Ill. Fl. i. 267, fig. 626 (1896), not Roth (1795), is the plant of western North America, extending eastward to Manitoba, Minnesota, Nebraska and Missouri. Var. *atlanticus* is the plant of the Atlantic coast, with an isolated and in some ways transitional area in the saline region of interior New York. True *S. paludosus* is a very pale green plant, with culms mostly 0.5–2 cm. thick at base and 0.5–1.5 m. high; the cauline leaves mostly 3–5 (–6), with sheaths ascending well above the middle of the culm (but in starved colonies the culms lower and the leaves fewer and borne chiefly below the middle), their blades mostly 0.5–1.5 cm. broad, the veins near the orifice of the sheath prominent and usually thickened; spikelets whitish-brown to drab or pale brown; anthers 3.5–5 mm. long, standing well out of the spike-

lets on elongate filaments, the filaments, after falling of anthers, usually showing above the scales and twice to thrice the length of the achene; achene cuneate-obovate, rarely roundish, pale brown to olivaceous.

S. paludosus, var. *atlanticus* is not so pale; its culms are 1.5–7.5 dm. high, 2–8 mm. thick at base; the cauline leaves are usually 2–4 and borne chiefly below the middle (though in exceptional plants, perhaps mixed with *S. maritimus*, var. *Fernaldi*, more numerous and running high on the culm), the blades 1.5–9 mm. broad, the veins near summit of sheath delicate and inconspicuous; spikelets chestnut-brown to blackish-fuscous; anthers 2–3.5 mm. long, mostly not exceeding scales, the old filaments rarely exserted and shorter than to about twice the length of the achene; the achene rounded-obovate to suborbicular, only exceptionally cuneate, olivaceous to deep brown. In central and western New York the plant geographically somewhat intermediate between true *S. paludosus* and var. *atlanticus* has the anthers up to 4 mm. long and the achene often cuneate at base. Along the coast of the Gulf of St. Lawrence and of the Atlantic occasional colonies seem like hybrids of *S. paludosus*, var. *atlanticus* and *S. maritimus*, var. *Fernaldi*.

True western *Scirpus paludosus* has an evident tendency to branching of the inflorescence; var. *atlanticus* not. Of the 186 inflorescences of *S. paludosus* before me 124 have simple or at least closely crowded glomerules, 62 (33%) have 1 or 2 (rarely 3 or 4) obvious elongate rays. Of 420 inflorescences of var. *atlanticus* only 20 (less than 4%) show a single (in 1 case 2) short ray. On the Atlantic coast the plant with fuscous spikelets frequently on definite or elongate rays is *S. maritimus*, var. *Fernaldi*. Of the 210 inflorescences of it before me 172 (nearly 82%) have definite (sometimes forking) rays (26 with 1 ray, 77 with 2, 28 with 3, 20 with 4, 13 with 5, 13 with 6, 6 with 7, 5 with 8, 1 with 11, 1 with 12 and 4 with 13).

Although Beetle in Am. Journ. Bot. xxix. 83 (1942) cites *Scirpus paludosus* as occurring in the "EAST INDIES: *Ekman 1325*" (this citation placed between New Jersey and Minnesota), there is grave doubt about it. I have not seen no. 1325 and can, consequently, not check its identity; at least, it presumably came from the *West* Indies.

S. expansus, sp. nov. (TAB. 767, FIG. 1–3), planta habitu *S. sylvatici;* culmo 0.5–1.6 m. alto ad basin 0.6–1.5 cm. crasso superne scabro; foliis 1–2.5 cm. latis, vaginis coriaceis valde septato-nodulosis; involucri foliis 3–8, imis panicula superantibus; panicula 1–3 dm. alta radiis adscendentibus vel divaricatis; pedicellis valde pilosis; spiculis 3–5 mm. longis, plerumque glomerulatis; squamis valde carinatis apice subulatis; antheris 1.3–1.6 mm. longis.—Spring-heads, borders of rills, springy meadows, swales, etc., southwestern Maine to southern Michigan, south to Georgia. The following, selected from a large series, are representative. MAINE: South Poland, 1895, *Kate Furbish; Typha* swamp, bank, Presumpscot River, August 13, 1903, *Collins & Chamberlain,* no. 614 (TYPE in Herb. Gray.); springy spot, Great Chebeague Island, *Fernald,* no. 1401; swale at border of salt marsh, Wells, *Fernald & Long,* no. 12,851; swamp, York Harbor, July 22, 1901, *F. T. Hubbard.* NEW HAMPSHIRE: Hanover, August, 1878, *Jesup;* Ore Hill, Warren, July 26, 1910, *E. F. Williams;* shore of Johnson Creek, Madbury, *Hodgdon,* no. 2629. VERMONT: Gulf Brook swamp, Townshend, September 10, 1912, *L. A. Wheeler.* MASSACHUSETTS: south end of Horn Pond, Woburn, August 4, 1869, *Wm. Boott;* South Sudbury, June 17, 1902, *Rich, Fernald & Williams;* Westfield, July 10, 1860, *Wm. Boott;* brook in cold bog, Shirley, August 27, 1916, *Churchill;* brooksides, Uxbridge, June 23, 1876, *Morong;* shore of small pond, Granville, *F. C. Seymour,* no. 388; New Salem, July 28, 1931, *Goodale, Potshay & St. John;* brookside, New Marlboro, August 30, 1902, *Ralph Hoffmann.* CONNECTICUT: West Hartford, July 13, 1901, *H. J. Koehler;* swamp, Southington, *Bissell,* no. 722; New Hartford, August 10, 1883, *Chas. Wright;* along Steele Brook, Waterbury, *Blewitt,* no. 456; open swamp, Milford, *E. H. Eames,* no. 4000. NEW YORK: wet ditch, Fort Anne, Washington County, *Burnham,* no. 46; along a cold stream, 4 miles south of Utica, *Haberer,* no. 1184; Waterville, Oneida County, August 18, 1917, *House.* NEW JERSEY: Rosenkraus Run, Sussex County, August 11, 1917, *E. B. Bartram.* PENNSYLVANIA: open marshy, springy swale, Lehigh Gap Station, *Pretz,* no. 13,253; roadside ditch, 2 miles north of Sadsburyville, Chester County, June 29, 1924, *H. E. Stone;* Big Meadow Run, Farmington, Fayette County, June 4, 1931, *Core.* DELAWARE: along brooks, Centreville, August, 1869, *Commons.* DISTRICT OF COLUMBIA: Washington, 1881 ("the most southern locality known"), *Scribner.* VIRGINIA: South Fork of Holston River, St. Clair's Bottom, Smyth County, July 30, 1892, *Small.* NORTH CAROLINA: near Hickory, Catawba County, *Heller,* no. 274. GEORGIA: in cool shaded brook at northern base of Stone Mountain, *Harper,* no. 205. MICHIGAN: swamp, Grand Rapids, July 20, 1900, *Emma J. Cole.*

Scirpus expansus is the plant which regularly passes in the eastern United States as *S. sylvaticus* L. of Eurasia. The resemblance is merely superficial, for in most characters there are clear distinctions. *S. sylvaticus* has thinner leaves, with scarious sheaths, the summit of the inner band easily friable, the blades 6–14 mm. wide; in *S. expansus* the hard and thickish blades are 1–2.5 cm. broad, the coriaceous sheaths strongly septate-nodulose (in *S. sylvaticus* only faintly, if at all, so), the summit of the inner band firmer. In *S. sylvaticus* the relatively slender culm is smooth to summit; in *S. expansus* the usually coarser culm is scabrous at summit (for 1–5 cm.). In *S. sylvaticus* the longest smooth and thin leaf of the involucre is 0.7–2 dm. long, only rarely exceeding the panicle; in *S. expansus* it is firm and harshly scabrous beneath and 1.5–3 dm. long, often overtopping the panicle. In *S. sylvaticus* the mature panicle is lax, with loosely spreading to recurving longer rays, the panicle 1–2 dm. high; in *S. expansus* the longer rays (FIG. 4) are more stiffly ascending to divergent, only the short basal ones much recurving, and the panicle, when well developed, is 1.5–3 dm. high. In *S. sylvaticus* the spikelets (FIGS. 4 and 5) are 3–4 mm. long and in glomerules of 2–5, the ultimate lateral pedicels often terminated by single spikelets; in *S. expansus* the principal glomerules have 3–12 (rarely to 40) spikelets 3–5 mm. long, only a rare ultimate pedicel with a solitary one. In *S. sylvaticus* the pedicels are minutely scabridulous; in *S. expansus* closely pilose. In *S. sylvaticus* the scales of the spikelet (FIG. 5) are blunt or barely mucronate by the extension of the relatively weak midrib; in *S. expansus* they (FIG. 3) have subulate-acuminate tips, through the extension of the very prominent keel-like midrib. In *S. sylvaticus* the anthers (FIG. 5) are 0.7–1 mm. long; in *S. expansus* (FIG. 3) 1.3–1.6 mm. long.

Forma **Bissellii** (Fernald), comb. nov. *S. sylvaticus,* var. *Bissellii* Fernald in RHODORA, ii. 21 (1905); *S. microcarpus,* var. *Bissellii* (Fern.) House in Bull. N. Y. State Mus. nos. 243–244: 18 (1923). *S. sylvaticus,* forma *Bissellii* (Fern.) Carpenter in Dole, Fl. Vt. ed. 3: 76 (1937).

Forma **globulosus,** f. nov., glomerulis globosis 7–12 mm. diametro, spiculis 20–60 congestis valde imbricatis 3–4 mm. longis.—NEW YORK: Lyon's Falls, Lewis County, August, 1882, *J. V. Haberer* (TYPE in Herb. Gray.).

A very unusual extreme, the inflorescence, with large globose heads of very numerous spikelets superficially suggesting the most extreme *Juncus canadensis* J. Gay. Not to be confused with forma *Bissellii*. That has the large glomerules 1–2 cm. in diameter and composed of loosely divergent linear-cylindric spikelets 6–14 mm. long.

Since some botanists place *Scirpus expansus* under the western North American *S. microcarpus* Presl, it is well to point out that *S. microcarpus* has 2 stigmas and lenticular achenes; *S. expansus* 3 stigmas and trigonous achenes. In *S. microcarpus* the smooth or nearly smooth leaf-sheaths and the leaf-blades are thinner and smoother than in *S. expansus*, the involucre only slightly if at all exceeding the inflorescence; as contrasted with the heavier and septate-nodulose sheaths of *S. expansus*, the broader and firmer blades scabrous beneath and the usually longer involucres. In its thin and relatively narrow leaves with smooth or nearly smooth sheaths *S. microcarpus* is more like *S. sylvaticus* of Eurasia. In the texture of its scales and the size of its panicle (0.8–2 dm., only exceptionally—3 dm. high) it is more like the latter, but the glomerules have many more and usually longer spikelets. Unless all members of the section are to be reduced to an all-inclusive *S. sylvaticus*, with several constant and geographically isolated subdivisions, some with 2 stigmas, others with 3, these fundamental characters of the pistil associated with other characters, the three North American members of the series, *S. microcarpus* Presl, *S. rubrotinctus* Fern. and *S. expansus* are well marked species.

In PLATE 767, FIGS. 1–3 are of SCIRPUS EXPANSUS, from the TYPE: FIG. 1, inflorescence, × ⅖; FIG. 2, portion of inflorescence, to show characteristic ascending branches with spikelets mostly glomerulate, × 3; FIG. 3, spikelet with anthers, × 10. FIGS. 4 and 5, S. SYLVATICUS from Tassin, France, *Boulin:* FIG. 4, small portion of inflorescence to show characteristic divergent branching, with lateral spikelets often solitary, × 3; FIG. 5, spikelets with anthers, × 10.

S. RUBROTINCTUS Fern., forma **radiosus,** f. nov., spiculis lineari-cylindricis 7–13 mm. longis in glomerulis radiosis 1.5–2.3 cm. diametro aggregatis.—MAINE: tidal swales along Cathance River, Bowdoinham, September 14 and 19, 1926, *Fernald & Long*, nos. 12,853 (TYPE in Herb. Gray.), 12,854; ditch near wharf, Camden, August 11, 1902, *G. G. Kennedy*.

The counterpart in *Scirpus rubrotinctus* of *S. expansus*, forma *Bissellii*.

S. ATROVIRENS Muhl., var. GEORGIANUS (Harper) Fern., forma **cephalanthus,** f. nov., glomerulis dense confertis in capitulo 1.3–5 cm. diametro aggregatis. TYPE: river-thicket, Veazie, Maine, August 25, 1908, *Fernald* (in Herb. Gray.).

S. ATROVIRENS Muhl., var. GEORGIANUS (Harper) Fern., forma **angustispicatus,** f. nov., spiculis anguste cylindricis ad 1 cm. longis. TYPE: wet shore of Housatonic River, Newtown, Connecticut, August 17, 1928, *E. H. Eames,* no. 10,692 (in Herb. Gray.).

S. POLYPHYLLUS Vahl, forma **macrostachys** (Boeckl.), comb. nov. Var. *macrostachys* Boeckl. in Linnaea, xxxvi. 731 (1870).

VI. THE IDENTITY OF SCLERIA SETACEA OF POIRET

One of the most definite and easily recognized species of *Scleria* is the handsome and tall cespitose but lax plant with soft and almost wing-angled easily compressed culms up to 1 m. high; broad, lax leaves up to 8 mm. wide; long, drooping, filiform, lateral peduncles and loosely fastigiate terminal panicles up to 4 cm. long; the globose and reticulate achenes with spirally arranged pits and pubescent surfaces, the hypogynium with 3 broad erect lobes. This relatively tall species occurs from warm-temperate eastern South America, the West Indies and Florida to eastern Texas and Mexico, north in the Atlantic States to Long Island, and locally in the interior to Indiana.

This is the handsome plant beautifully described as *S. laxa* by Torrey in Ann. Lyc. N. Y. iii. 376 (1836), Torrey's appropriate name unfortunately preempted by the Australian *S. laxa* R. Br. (1810). Somewhat earlier Muhlenberg had described the same plant from North Carolina as *S. reticularis* Muhl. Descr. Gram. 266 (1817), he mistaking it for *S. reticularis* Michx. (1803). This confusion was soon noted, however, and there resulted two names: *S. Muhlenbergii* Steud. Nom. ed. 2, ii. 543 (1841), based upon "S. laxa. *Torr.* (non *R. Br.*) S. reticularis *Mhlbrg. Pursh.* (non *Michx.*)"; and, a little later, *S. Torreyana* Walp. Ann. iii. 696 (1852), based on *S. laxa* Torr. Other but later names were given to the plant; *S. Muhlenbergii* Steud., however, being the earliest available one, we may in this note omit the others, especially since their exact identification is not now possible. For this tall plant with compressed-trigonous culms, broad and

flat leaves and terminal lax panicles up to 4 cm. high Core, in his *American Species of Scleria* in Brittonia, ii. 79 (1936), takes up *S. setacea* Poir. in Lam. Encyc. vii. 4 (1806); and others, as unwittingly as myself, have trustingly followed him.

The photograph of the type of *S. setacea* Poir., however, thoroughly agrees with the original description:

> 8. Sclérie à feuilles sétacées. *Scleria setacea.*
>
> *Scleria culmo foliisque setaceis, glaberrimis; spicis axillaribus, minimis, longè pedunculatis; spiculis angustis, pedicellatis seu subsessilibus* (N.)
>
> Ses racines sont courtes, fibreuses, fasciculées: il s'en élève des tiges nombreuses . . . , haute de huit à dix pouces & plus, très-grêles, fines, sétacées, triangulaires . . .
>
> De l'orifice de chaque gaîne, même à partir de celles du bas, il sort un pédoncule droit, très-fin, long d'un pouce & plus, terminé par deux, trois, à peine quatre épillets pédicellés, quelquefois un ou deux sessiles, petites, étroits, ovales-oblongs, aigues, d'un roux-clair, munis de petites bractées courtes, sétacées, a peu près de la longeur de l'épillet.
>
> Cette plante croît dans l'Amérique; elle e été recueillie par M. Ledru à Porto-Ricco (*V. s. in herb. Lam.*)

It is most difficult to imagine how *Scleria Muhlenbergii* could ever have been identified with *S. setacea*, described as having setaceous culms up to 10 inches high, setaceous leaves, small red spikes, etc., the photograph before me showing the terminal inflorescence to be compact and 6–8 mm. high. Search in West Indian *Scleria* shows nothing like it, *S. Brittonii* Core and *S. georgiana* Core both having elongate horizontal rhizomes and larger terminal inflorescences; but the slender and acuminate reddish spikelets and the dense non-rhizomatous base at once suggest *Rhynchospora*. Turning to that genus, the type of *Scleria setacea* Poir. is promptly matched, even to the short-peduncled inflorescences in the lower leaf-axils, by R. setacea (Berg.) Boeckl., based upon *Schoenus setaceus* Bergius (1772). The fact that Poiret, in 1806, used the same specific name was merely coincidence; but the fact that his *Scleria setacea* coincides with *Schoenus setaceus*, therefore with *Rhynchospora setacea*, removes that wholly misinterpreted name from the valid species of *Scleria*. The many North American, West Indian and South American specimens recently marked "*Scleria setacea* Poir.", should be changed to S. Muhlenbergii Steud.

VII. WHAT IS ANGELICA TRIQUINATA?

(Plates 768 and 769)

In his Flora Boreali-Americana, i. 167 (1803) Michaux described from "Canada" a single species of *Angelica* as

> TRIQUINATA. A. petiolo tripartito; partitionibus pinnato-quinquefoliolatis; foliolis inciso-dentatis; terminalium impari rhombeo, sessili, lateralibus decursivis.
> *Obs.* Glabra: pedunculo pedicellisque minutissima pube subcandicantibus.
> *Hab.* in Canada.

Pursh (1814) took it up, literally copying Michaux's diagnosis but giving the range "In Canada and on the mountains of Virginia", from which it is probable that Pursh was stretching the name to cover the later published *Angelica Curtisii* Buckl.; and others, Bigelow, Fl. Bost. (1814) for instance, accepted it for the common New England *A. atropurpurea* L.

In 1818 three different authors independently considered *Angelica triquinata* to be the plant of dry woods and thickets southward, with stem closely tomentulose above, with thick lanceolate to oblong regularly and closely serrate leaflets, the upper or bracteal leaves (subtending inflorescences) reduced to linear-cylindric or lanceolate tubular sheaths with tiny blades, the plant which Walter, Fl. Carol. 115 (1788) had well described as *Ferula villosa*, i. e. *Angelica villosa* (Walt.) BSP. Muhlenberg, Cat. ed. 2: 30 (1818), substituted for *A. triquinata* Michx. his own *A. hirsuta*, saying without quibble ANGÉLICA . . . "1 hirsuta, *triquinata*, Mx." and giving the single descriptive word, "downy", Muhlenberg's plant coming from "Pens. fl. Aug. N. Eb." At best *A. hirsuta* Muhl. is a nomen subnudum; but since he used the name as a substitute[1] for *A. triquinata* Michx. (1803) it is illegitimate. Nuttall, also in 1818, took up *A. triquinata*, obviously for *Ferula villosa* Walt. His description of the plant "Common around Philadelphia" was good, except for the phrase, "Leaves sharply and incisely serrate", evidently borrowed from Michaux; and, obviously not understanding Michaux's plant, he commented on the plant of "Canada to

[1] In his Cat. ed. 1: 31 (1813) Muhlenberg had published the trinomial *Angelica hirsuta triquinata* as a "downy" plant of "Pens." It was in the 2nd edition (1818) that he cited *A. triquinata* Michx. as a synonym of his *A. hirsuta*.

Carolina" as "Certainly a genuine species". In the same year Sprengel, Species Umbelliferarum minus cognitae, 69, t. vi. fig. 12 (1818), based his *Pastinaca triquinata* upon *Angelica triquinata* Michx., "Habitat in Canada et Virginia" (borrowed from Pursh), and gave a fine description and excellent illustration of *Ferula villosa* Walt., changing the "Foliolis inciso-dentatis; terminalium impari rhombeo, sessili" etc. of Michaux (impossible for *Ferula villosa*) to "foliolis oblongis" of *F. villosa*, and noting the reduced upper blades and sheath-like petioles of the latter, "Superiora minus divisa vaginis petiolaribus insidentia".

Many authors followed these false leads and the name *Angelica triquinata* Michx. became general, as the first supposedly available combination under *Angelica* (following the sensible, therefore abandoned, "Kew Rule") for *Ferula villosa* Walt.; not merely Nuttall and Sprengel so using it, but Elliott, Torrey, DeCandolle and others accepting the identification. When Sprengel took it up as the basis of *Pastinaca triquinata* (Michx.) Spreng. he did so in a work on Umbelliferae "minus cognitae", and his phrase very definitely described his understanding of Michaux's plant. When he first studied Michaux's herbarium Asa Gray saw the error, his memorandum reading "Not the least what we call *A. triquinata*. DC. has confounded strangely if he ever saw Michx's. plant . . . It is *A. atropurpurea*?—tho' very poor specimen".

Gray's guess is hardly better than that of his predecessors, for even his "tho' very poor specimen" does not endow the Michaux plant with the characters of *A. atropurpurea*. In the latter the upper leaves, which subtend inflorescences, have large, inflated and round-tipped stipular sheaths extending quite to the summit of the obscure petiole, so that the 3 divisions of the leaf are essentially sessile, and the leaflets are not incised-dentate. Furthermore, the subspherical umbel has 20–46 rays. In 1903 I made a photograph of the Michaux TYPE at Paris. This (PLATE 768) shows, × ½, the incised-dentate leaflets, the terminal unequally rhombic, the lateral decurrent, as described by Michaux. It also shows the stipular sheath narrow and tapering to the elongate and naked upper half of the petiole; and the axillary branch has one slender and tubular bladeless sheath and an immature umbel with only 7 ascending rays. I have been over, with Dr. Hugh M. Raup, all known eastern North

American *Umbelliferae.* Every one of them is quickly rejected as not Michaux's plant, except the Alleghenian *A. Curtisii* Buckley, Am. Journ. Sci. xlv. 173 (1843) which follows the upland and the mountains from Pennsylvania to Georgia. Buckley's species gives a good match for *A. triquinata,* a more modern specimen from the Blue Ridge of Virginia (near Luray, alt. 3600 ft., *Steele & Steele,* no. 213), reproduced as PLATE 769, showing a portion of a plant, × ½, with the tapering sheath (at base), the elongate petiole (near base), the incised leaflets, the terminal one rhombic, the lateral (upper) ones decurrent and the few-rayed umbel of the Michaux type. Buckley's plant, from "High mountains of North Carolina" had "petioles large, long, and sheathed at the base; segments of the leaves 3–5, leaflets large and deeply laciniate". It is evident that "Canada" of Michaux's label and description was a clerical error for CAROLINA, Michaux having collected extensively in the Carolina mountains. It is clear, then, that the name *Angelica Curtisii* Buckley (1843) must give way to A. TRIQUINATA Michx. (1803).

Another reason for thus reviewing the interpretations of *Angelica triquinata* is the fact that the name *A. villosa* (Walt.) BSP. Prelim. Cat. N. Y. 22 (1888) is a later homonym, invalidated by the fully described *A. villosa* Lagasca, Gen. et Sp. Pl. 12 (1816), a plant of Asturia. Since, furthermore, *A. hirsuta* Muhl. was an illegitimate substitute for *A. triquinata* Michx., the name *hirsuta* used very carelessly for a plant which is not hirsute but said to be "downy" (many a youth with downy face has anxiously waited for it to become hirsute), the name *A. triquinata,* long used for *A. villosa,* seemed to come into the running. That it cannot be taken up for *A. villosa* (Walt.) BSP. should be sufficiently clear.

Only one other name is sometimes cited as synonymous with *Angelica villosa* (Walt.) BSP. This is *Cicuta venenosa* Greenway in Trans. Am. Phil. Soc. iii. 235 (1793), incorrectly cited by Pursh as *C. venenata* in his synonymy of *Ferula villosa.* Greenway, not now a well known botanist, was "*Dr. James Greenway, of Dinwiddie-County, in Virginia.*" His account of the plant as an acute poison when eaten and his very detailed description are conclusive. It is unnecessary to quote the whole, but Dr. Greenway's solicitude for the Philosophical Society, to whom he

communicated his paper on February 19, 1790, is worth quoting: "I will here insert the description, as it stands in my catalogue, first, in botanical terms, for such as are lovers of that science, and then in language, as plainly English as the subject will admit, for the sake of those to whom those terms are less familiar." The detailed description, with "Caulis . . . quatuor pedes altus, teres, . . . superne tomentosus.—Folia petiolata, petiolis semi-amplexicaulibus, . . . triternata, bipinnata, . . . foliolis sessilibus, oblongo-lanceolatis, serratis", and the habitat and flowering season (in Dinwiddie County), "Locis campestribus et collibus apricis gaudet: mensibus Julii Augustique floret", are wholly indicative of *A. villosa*. The latter should, therefore, be called:

ANGELICA **venenosa** (Greenway), comb. nov. *Cicuta venenosa* Greenway in Trans. Am. Phil. Soc. iii. 335 (1793). *Ferula villosa* Walt. Fl. Carol. 115 (1788). *A. triquinata* sensu Nutt. Gen. i. 186 (1818) and later authors, not Michx. (1803). *Pastinaca triquinata* Spreng. Spec. Umb. 69, t. vi. fig. 12 (1818) as to plant described and illustrated, not as to source of epithet, *A. triquinata* Michx. *Archangelica hirsuta* Torr. & Gr. Fl. N. Am. i. 622 (1840) as to plant described, only in part upon source of epithet, *Angelica hirsuta* Muhl. Cat. ed. 2: 30 (1818), an illegitimate substitute (as treated by Muhlenberg) for the early *A. triquinata* Michx. (1803). *A. villosa* (Walt.) BSP. Prelim. Cat. N. Y. 22 (1888) by inference only, not *A. villosa* Lagasca, Gen. et Sp. Pl. 12 (1816).

MEMORANDUM REGARDING JAMES GREENWAY.—I am indebted to Mr. J. M. Townsend of Petersburg, Virginia, for a reference to Castiglioni's Reise durch die Vereinigten Staaten von Nord-Amerika in den Jahren 1785, 1786 and 1787. On p. 274 of this German translation we read:

"Eine Meile von Petersburg liegt die Wohnung des Obristen **Banister,** der eine ausgedehnte Pflanzung besitzt. Er is ein Enkel des berühmten **John Banister,** der seine Stelle als Professor der Botanik und Bibliothekar der Universität Oxford niederlegte, und sich in diesem Thiele von Virginien niederliess, wo er mit grosser Mühe und seltenem Urtheil eine Menge der seltensten Pflanzen sammelte, und beschrieb. . . Am folgenden Tage stattete ich einen Besuch beym **D. Greenway** ab, der ein Engländer von Geburt, und ein Liebhaber der Botanik ist. Er hatte sich selbst mit den Grundsätzen des Linneischen Systems be-

kannt gemacht, und wusste mehr als 600 Pflanzen zu nennen, unter denen einige ziemlich seltene und noch unbeschriebene waren."

Mr. Townsend also most kindly transcribes for me extracts about Dr. James Greenway from the recently (1942) published Dinwiddie County "The Country of the Apamatica", compiled by the workers of the Writer's Program of the Works Projects Administration. From this account (p. 77) I quote: "It was after he had established himself in Dinwiddie as a man of wealth and importance—somewhat Scottish as he was—that he turned his whole attention to natural history and botany. Some 40 volumes that deal with plants of Virginia and North Carolina flowed from his pen and won him honorary membership in several European societies and friendships with scholars the world over. Thomas Jefferson, that great patron of learning, frequently corresponded with Dr. Greenway and gave consistent encouragement to the botanical investigations of the Dinwiddie scientist."

I have hunted in vain, with the collaboration of Dr. Schubert, for the "40 volumes that deal with plants". Pritzel (Thesaurus) did not know of them. Dryander, Cat. Bibl. Hist.-Nat. Banks, iii. 542 and 598 (1797) and the Royal Society Catalogue, iii. 5 (1869) could muster only the two short papers in vol. iii. of the American Philosophical Society's Transactions (1793), the first on *Cassia Chamaecrista* as a soil-renovator, the second the account of *Cicuta venenosa*. If, contemporary with Thomas Walter (1788) and prior to Michaux (1803), Pursh (1814) and Elliott (1816 et seq.), there were two score volumes published, describing in such clear diagnoses as that of *Cicuta venenosa* 600 plants of Virginia and North Carolina, their discovery would be of utmost importance and extremely disconcerting.

Through the most helpful cooperation of Messrs. Jack Dalton of the Alderman Library at the University of Virginia and R. W. Church of the Virginia State Library the excitement among taxonomists over the "40 volumes that deal with plants of Virginia and North Carolina [which] flowed from his [Greenway's] pen" is now abated. Under date of November 21, 1942, Mr. Dalton wrote: "The reference . . . puzzles us as much as it does you. I have examined our catalogues, the calendars of

Jefferson's Correspondence, the bibliographies, English and American, available here, and *Swem's Index*, and have not been able to find the slightest evidence of the existence of the forty volumes or the voluminous correspondence of Jefferson. Dr. Greenway's name is not mentioned in our calendar of Jefferson's correspondence". Mr. Church, examining the notes made by the Virginia Writer's Project in connection with their history of Dinwiddie County, found that the statement concerning the forty volumes was derived from the Memoirs of Lieutenant General Winfield Scott, vol. 1, pp. 3–6 of the edition of 1864. Here is the quotation as filed by the authors of the history of Dinwiddie County:

"His professional reputation brought him patients from a wide circumference, but, as he became rich, he gradually withdrew from the practice of medicine, and gave himself up to the culture of polite literature and natural history, particularly botany, and left a *hortus siccus* of some forty folio volumes in which all the more interesting plants, etc., of Virginia and North Carolina, were described in classical English and Latin."

A *hortus siccus* being a collection of dried plants (an herbarium) it is evident that the presumably very accurate descriptions of Greenway which "flowed from his pen" did not reach publication.

In publishing the genus GREENWAYA Giseke, Praelect. Ord. Nat. Plant. 226 (1792), wrote: "in honorem Cl. . . . GREENWAY, Med. Dris. in Virginia, cujus amicitiam & cum eo commercium debui epistolarum Cl. Drury, inter Entomologos celebri. Misit ille ab a. 1773–1775. plantas Virginicas siccatas, vivas a se collectas, ad 400. eo fine ad me, ut novam Floram Virginicam juncto labore concinnaremus, sed bello inter Anglos & colonias orto, conatus omnis profligatus est, ita ut nesciam num vivus adhuc supersit nec-ne? Eo tamen labore utique de Botanica meritus est".

(To be continued)

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CXLVIII

M. L. Fernald

(*Continued from page 303*)

VIII. NOTES ON HIERACIUM

Hieracium **Robinsonii** (Zahn), stat. nov. *H. smolandicum*, subsp. *Robinsonii* Zahn in Engler, Pflanzenr. iv[280]. 468 (1921).

Although Zahn placed with doubt the plant collected by Robinson & Schrenk in southeastern Newfoundland under the Scandinavian *H. smolandicum* Almq. it differs in so many strong characters that I think it wiser to consider it an endemic eastern American species. So far as I have yet found there is no evidence that any of the European members of the complex Section *Vulgata* are indigenous with us. We have a very diverse lot of introduced and weedy plants of the section. *H. Robinsonii*, however, is indigenous along chiefly slaty river-banks in Newfoundland, eastern Quebec, Cape Breton, northern Maine and northern New Hampshire. From the Scandinavian *H. smolandicum* our native plant differs in its thick and firm leaves glabrous beneath or merely short-pilose along the midrib, the cauline leaves twice as many, mostly 4–10, and more gradually decreasing in size to the summit (in *H. smolandicum* the thin leaves copiously long-villous, the cauline 3–6 and confined chiefly to lower half of stem), and the phyllaries caudate-attenuate (in *H. smolandicum* blunt or merely acuminate).

It is at present quite impossible to identify with any certainty the diverse series of introductions belonging in the macro-species *Hieracium vulgatum*. In his inclusive *H. vulgatum* Zahn recognizes 144 so-called "subspecies" and many varieties, the subspecies sometimes grouped under such unilluminating heads as "*a*. Folia latiora" opposed to "*b*. Folia angustiora" or "a. Squamae dorso vel margine parcefloccosae" opposed to "b. Squamae efloccosae atrae nitentes", the latter series containing "subspecies" with "Involucra . . . interdum parcefloccosa" (subsp. no. 131) or "squamis . . . parcefloccosis" (subsp. no. 132), the former series with "subspecies" with "squamis . . . subefloccosis". In other cases series of 20 or 30 "subspecies" are enumerated without even these hair-

splitting differentiations. Surely, without a clearer understanding of and a saner guide to the European variations of this heteromorphic group, it is better for the present to pass all the introduced plants of § *Vulgata*, with basal leaves narrowed to the petiole as *H. vulgatum*.

Returning to *Hieracium Robinsonii*, Zahn's very full description of the *Robinson & Schrenk* plant is accompanied by the following synonymy: "An *H. molle* Pursh Fl. Am. sept. II, (1816) 503? *H. vulgatum* Gray Syn. Fl. N.-Am. I. 2 (1884) 429". As to the plants of the Synoptical Flora designated by Gray (on p. 424, not 429) as *H. vulgatum* from "Labrador, *Kohlmeister*, &c. Canada, on shores of the Lower St. Lawrence (*Macoun*), there perhaps introduced", they are of two very different species. The Labrador element is *H. groenlandicum* Arv.-Touv., which is native in outer Labrador, northern Newfoundland, and Anticosti, as well as Greenland, while the Macoun material seen by Gray was a sheet of Macoun's (August, 1883) with two species, the data reading: "Shores of the St Lawrence from Point Levis to Anticosti. Locality. Point Levis (Large specimen), River de Brig, Anticosti". The plant from Levis is the ubiquitous weedy species which abounds in the region of Quebec city, *H. vulgatum* Fries; the Anticosti specimen is good *H. groenlandicum*. As for *H. molle* sensu Pursh, not Jacquin, that was evidently *H. groenlandicum* also; incidentally the date of Pursh was 1814, not 1816 as given by Zahn.

The type and only specimen of *H. Robinsonii* seen by Zahn came from the southeastern side of Newfoundland, more than 550 miles southeast of the mouth of the St. Lawrence River[1]. Nevertheless Zahn, with the Germanic inaccuracy regarding American geography to which we have become accustomed, concocted the citation: "Am unteren Lorenzstrom: Cataracts of Rocky River in Newfoundland". The following are the stations for *H. Robinsonii* (often distributed as *H. vulgatum*) represented in the Gray Herbarium and the Herbarium of the New England Botanical Club.

Newfoundland: crevices of rocks, infrequent, South Arm River, Holyrood, and Cataracts of Rocky River, *Robinson &*

[1] Equivalent in distance to placing Berlin in England, on the western coast of Norway, on the Gulf of Riga, on the Dneiper River or on the Mediterranean, or equivalent in distance to placing Vienna on the Seine or in Belgium or on Sardinia.

Schrenk, no. 227 (ISOTYPE); ledges and gravel along Waterford River between Waterford Bridge and St. John's, *Fernald & Wiegand*, no. 6439. QUEBEC: Saguenay River, Roberval, July 18, 1892, *G. G. Kennedy;* ledges along River Ste. Anne des Monts, Gaspé County, August, 1905, *Collins & Fernald;* ledges below Fraser Falls, Rivière du Loup, July 11 and 13, 1904, *Collins & Fernald;* rocks by Lower Fall, Rivière du Loup, *A. S. Pease*, no. 2477. NOVA SCOTIA: gravel in river-bottoms, Big Intervale, Cape Breton Island, *Macoun*, no. 16,699. MAINE: argillaceous ledges by Meduxnakeag River, Monticello, *Fernald & Long*, no. 14,923; abundant in crevices of calcareous ledges and on cliffs by Mattawamkeag River, at foot of the Island, Island Falls, September 8, 1897, *Fernald;* cliffs (calcareous slate) along Piscataquis River, Sangerville, June 26, 1895, *Fernald*, no. 236; July 15 and 29, 1900, *W. N. Park;* rocky soil about ledges, Carrabassett River, North Anson, July 4, 1885, *J. F. Collins.* NEW HAMPSHIRE: ledges, Gorge of Diamond River, Dartmouth College Grant, Coös County, *Pease*, no. 10,513.

It may be serviceable to others to have my key-characters separating the 4 species of § *Vulgata* which I can recognize in eastern America:

a. Stem truly scapiform or subscapiform, naked or with 1 or 2 cauline leaves borne near base; lowest leaves with rounded or cordate bases.....*H. murorum* L. (locally adventive from Europe).

a. Stem with 2–12 leaves scattered to near inflorescence; lower leaves attenuate to petioles....*b.*

b. Involucre and pedicels stipitate-glandular, with no or but few glandless villi overtopping the glands; inflorescence paniculate-corymbose, with arched- or divergent-ascending branches and pedicels; heads few—30 or more. *H. vulgatum* Fries (All-inclusive series of introductions).

b. Involucre and pedicels glandless or only very minutely glandular, copiously long-pilose or villous with glandless hairs; inflorescence strict, with 1–10(–20) heads on erect peduncles or branches; indigenous.

Larger (lower) leaves 1–5 cm. broad, membranaceous, villous-ciliate, their petioles and the midribs of lower surfaces copiously villous; heads (1–)4–20; phyllaries blunt or acuminate.....*H. groenlandicum* Arv.-Touv.

Larger (lower) leaves 0.7–2 cm. broad, coriaceous, eciliate or nearly so, their petioles and the midribs of lower surfaces only sparsely pilose or glabrescent; heads 1–5(–8); phyllaries caudate-attenuate.....*H. Robinsonii.*

The stations known to me for *H. Robinsonii* are given above. Those of *H. groenlandicum* (outside Greenland) are as follows:

LABRADOR: Rama, *A. Stecker*, no. 347; open hillside, September Harbor, lat. 56° 31′, long. 61° 10′, *Bishop*, no. 608. NEWFOUNDLAND: thickets on slaty hills back of Little Quirpon, *Fernald &*

Gilbert, no. 29,268; thicket by Big Brook, Straits of Belle Isle, *Fernald & Long*, no. 29,267. Anticosti Island, Quebec: talus calcaire et barachois, Rivière au Saumon, *Victorin et al.*, no. 21,303; sur les platières élevées et sèches, R. au Saumon, *Victorin & Rolland*, no. 27,583; R. de Brig [c ?], *Macoun*, no. 18, in part; R. la Loutre, *Victorin & Rolland*, nos. 25,356–25, 358; à plusieurs milles en amont, R. Jupiter, *Victorin & Rolland*, no. 25,360; sur les platières sèches, R. du Brick, *Victorin & Rolland*, no. 27,579; sur la rocaille calcaire près de l'embouchure, R. à la Patate, *Victorin et al.*, no. 21,310; talus herbeux, R. Galiote, *Victorin & Rolland*, no. 25,359; sur les talus des gorges, R. Chicotte, *Victorin & Rolland*, no. 27,587; éboulis argilo-calcaires, R. Ferrée, *Victorin & Rolland*, no. 25,355; sur les talus d'alluvion, R. Belle, *Victorin & Rolland*, no. 27,591.

H. canadense Michx., var. **fasciculatum** (Pursh), stat. nov. *H. fasciculatum* Pursh, Fl. Am. Sept. ii. 504 (1814).

Var. *fasciculatum* is the common plant which passes in the Northern States and southern Canada as typical *Hieracium canadense*. It is, however, not the extreme of the species which Michaux had, from Lake Mistassini, and well described as *H. canadense* in his Fl. Bor.-Am. ii. 86 (1803). Michaux clearly described, and the beautiful photograph before me of his type shows, the northern extreme, mostly low, with few large and remote thin leaves and open paniculate-corymbose inflorescence of few long-peduncled heads with blackish involucre of oblong-lanceolate phyllaries. Typical *H. canadense* occurs from southern Labador to northern British Columbia, south to Newfoundland (where nearly ubiquitous), Cape Breton, Prince Edward Island, northern Maine, northern New Hampshire, Ontario, northern Michigan, northeastern Iowa, Saskatchewan, Montana, Idaho and Oregon. It is the plant which in the West passes as *H. columbianum* Rydb. or *H. canadense*, var. *columbianum* (Rydb.) St. John. It was also described as *H. macrophyllum* Pursh, Fl. Am. Sept. ii. 504 (1814), Pursh noting the distinctive characters, "panicula divaricato-corymbosa, pedunculis elongatis nudis", which is quite similar to Michaux's "corymbo paucifloro: pedunculis longis". Pursh also added the significant comment: "leaves the largest of the genus".

Var. *fasciculatum* is the common plant which occurs from southern Quebec to southern Ontario and Minnesota, south to Nova Scotia, New England, northern New Jersey, Pennsylvania, Ohio, Indiana, Illinois and Iowa. It was described by Pursh

"caule erecto folioso . . . ramis paniculae divaricatis brevibus, pedicellis subfasciculatis pubescentibus". It was also described by Pursh (p. 503) from western New York and Canada as *H. virgatum*.

Torrey & Gray understood typical *Hieracium canadense* and its var. *fasciculatum* but, without knowing Michaux's type, they reversed the two, calling var. *fasciculatum* typical *H. canadense* and treating the northern typical *H. canadense* (*H. macrophyllum* Pursh) as *H. canadense*, var. *latifolium* Torr. & Gr. Fl. N. Am. ii. 476 (1843). As I understand the species it falls into three well defined varieties as follows:

a. Involucre 8–13 mm. high; upper internodes of stem and branches without or with only a few scattered setae.
Involucre dark fuscous to blackish; median phyllaries oblong-lanceolate, 1.5–2 mm. broad, the inner ones fuscous throughout or with broad dark central band; stems 1.5–10 dm. high; leaves (5–)8–20(–30), mostly remote, thin or membranaceous to firm, oblong or narrowly ovate, lanceolate or oblanceolate; heads 1–many, on arched-ascending peduncles mostly 2–10 cm. long in an open or divaricately corymbiform panicle. . . *H. canadense* (typical).
Involucre pale olive; median phyllaries narrowly lance-attenuate, 1–2 mm. broad at base, the inner ones pale throughout or merely with slender greenish midrib and green tip; stems mostly 0.5–1.5 m. high, stiffly erect; leaves 25–50 or more, often subapproximate, lanceolate to narrowly oblong-ovate, thick to coriaceous; heads many, often subvirgately fascicled or subumbellately corymbose, on stiff peduncles mostly 0.5–4 cm. long. . . . . Var. *fasciculatum*.

a. Involucres 5–10 mm. high; panicle more or less virgate-fastigiate to umbelliform, with slender and erect elongate peduncles; stem slender, 0.5–9 dm. high, its middle and upper internodes and the peduncles copiously villous-hirsute with hairs 1.5–3 mm. long; leaves as in typical var. or the lower more strongly ciliate. . . . . Var. *hirtirameum*.

H. CANADENSE Michx. Fl. Bor.-Am. ii. 86 (1803). *H. macrophyllum* Pursh, Fl. Am. Sept. ii. 504 (1814). *H. canadense*, var. *latifolium* Torr. & Gray, Fl. N. Am. ii. 476 (1843). *H. auratum* sensu Fries, Epic. Gen. Hierac. 124 (1862) not Fries, Symb. Hist. Hierac. 181 (1848). *H. columbianum* Rydb. in Bull. Torr. Bot. Cl. xxviii. 513 (1901). *H. canadense columbianum*, as subsp. (Rydb.) Piper in Piper & Beattie, Fl. Se. Wash. 351 (1914). *H. canadense*, var. *macrophyllum* (Pursh) Farwell in Rep. Mich. Acad. Sci. xx. 195 (1918). *H. laevigatum* subsp. *canadense* (Michx.) Zahn in Engler, Pflanzenr. iv^{280}. 891 (1922). *H. canadense*, var. *columbianum* (Rydb.) St. John, Fl. Se. Wash. and Adj. Idaho, 459 (1937).—Range given above.

Var. FASCICULATUM (Pursh) Fernald, supra. *H. fasciculatum* Pursh, Fl. Am. Sept. ii. 504 (1814). *H. virgatum* Pursh, l. c. 503 (1814). *H. Kalmii* sensu Bigel. Fl. Bost. ed. 2: 288 (1824); sensu Torr. Compend. 280 (1826); sensu Spreng. Syst. iii. 646 (1826); not L. Sp. Pl. ii. 804 (1753).—Range given above.

Var. HIRTIRAMEUM Fernald in RHODORA, xvii. 19 (1915).—Damp to dry ledges, shores, cliffs and clearings, Newfoundland to Wisconsin, south to New Brunswick, New England and northeastern Pennsylvania.

As originally pointed out Var. *hirtirameum* is more inclined than other variations of the species to distortions due to aphids or fungi. Some altered individuals show secondary involucres only 2 mm. high.

As to *Hieracium Kalmii*, it was said by Linnaeus to have been collected in Pennsylvania by Kalm. The type, of which two different photographs are before me, looks like a meagre specimen of *H. canadense*, var. *fasciculatum*, for which Bigelow, Torrey and Sprengl mistook it. Its involucre, however, is less imbricated, with the phyllaries obtuse; and after studying the specimen Gray wrote: " . . . Scales of involucre narrowly linear, . . . in a single series . . . Ovaries . . . glabrous, not striate . . . Pappus a single series of fragile strongly denticulate-scabrous bristles . . . ; we are confident that his plant is not of North American origin".—Gray in Torr. & Gray, l. c. 479 (1843).

In describing *Hieracium canadense* Michaux compared it with the European *H. sabaudum* L., a species which superficially suggests typical *H. canadense*, but from which our native plant differs consistently in many characters. Since the European species is appearing locally as a weed with us it may here be recorded.

H. SABAUDUM L. Differing from *H. canadense* as follows: Hairs of lower internodes and leaf-surfaces bulbous-based; panicle occupying one third to two thirds the height of the plant, loosely paniculate, not umbelliform; involucre glabrous or with few nonglandular hairs (young involucre of *H. canadense* commonly somewhat glandular); phyllaries round tipped, the lowest spreading (in *H. canadense* at least the inner phyllaries attenuate to tip, all appressed).—Sp. Pl. ii. 804 (1753).—Old World species becoming naturalized with us. I have examined the following American material. MASSACHUSETTS: vacant grassy lot, Memorial Drive near Cottage Farm Bridge, Cambridge, October 6,

1928, *S. F. Blake*, no. 10,789, the plant now abundant and found elsewhere in Cambridge; abundant in vacant lot off Pleasant Street, Brookline, September 29, 1913, *F. F. Forbes*.

H. VENOSUM L., var. NUDICAULE (Michx.) Farwell in Mich. Acad. Sci. Rep. xx. 194 (1918). *H. Gronovii*, var. α. *nudicaule* Michx. Fl. Bor.-Am. ii. 87 (1803).

In making this transfer Dr. Farwell did not clearly differentiate between true *Hieracium venosum* and the variety. From the start the two Linnean species, *H. venosum* L. Sp. Pl. ii. 800 and *H. Gronovii* L. l. c. 802 (1753), were hopelessly mixed. As noted by Gray in Torrey & Gray, Fl. N. Am. 478 (1843) and as is apparent from the Linnean diagnoses his description of *H. venosum*, drawn directly from Gronovius, calls for a thick-stemmed plant: "HIERACIUM foliis cuneiformibus hirtis, scapo nudo crassissimo erecto"; while the very detailed description of *H. Gronovii*, "Folia *radicalia obovata, obtusa, integerrima, tenuitate membranacea, supra pilis raris adspersa, subtus subviolacea.* Caulis *pedalis, filiformis, uno alterove folio lanceolato, paniculatus, panicula inaequali*", vividly describes the plant which Willdenow, Sp. Pl. iii. 1570 (1804), Torrey & Gray and all later authors have called *H. venosum*. There is no type of *H. venosum* in the Linnean Herbarium but the citations by Linnaeus of the two Virginian plants, *Hieracium . . . lapathi venis sanguineis inscriptis foliis* of Plukenet and *H. . . . foliis punctis & venis sanguineis notatis* of Banister, and the descriptive name *H. venosum* can mean only the plant we know under that name. Willdenow and after him Torrey & Gray so used the name and, in view of the sad mixup at the start, this seems the right interpretation. As to *H. Gronovii*, as badly mixed, Gray, who studied the specimens involved, selected the plant of Gronovius cited by Linnaeus to typify that confused name.

Hieracium venosum may have strictly rosulate leaves and a naked scape or 1–6 cauline leaves, the latter series of selected specimens being *H. venosum*, var. β. *subcaulescens* Torr. & Gray. Experience in the field shows that it has no definite range and that individuals with and without cauline leaves are frequently associated. Taxonomically it seems wholly unimportant. So, it seems to me, is var. *Blombergii* Zahn in Engler, Pflanzenr. iv[280]. 1117 (1922). Its only character, the presence of abundant glands on the involucre, is altogether too evasive. Just where one

stops in estimating whether the involucre may be "tenuiter subglandulosa" (Zahn's characterization of typical *H. venosum*) and "densissime glandulosa" I do not know. Var. *Blombergii* was based on a single collection from Massachusetts. Of the 105 specimens from that state before me 6 show no appreciable glands on the involucre, 89 have them obvious but possible to count (from 1 to 6 or 8 on a phyllary) and could be described by Zahn's "tenuiter subglandulosa", and 10 specimens have enough glands to pass as "densissime glandulosa". I give up.

There seems to be, however, a very real geographic variation within *Hieracium venosum*. All material before me from New England (with the exception of a few sheets from Cape Cod, Martha's Vineyard and Nantucket) to southern Ontario, south into Pennsylvania and Kentucky, has the upper surfaces of the later and abundant basal leaves quite glabrous, although the smaller basal ones may have setose upper surfaces. Much of the material from Georgia to New Jersey and a few specimens from southeastern Massachusetts have the upper surfaces remotely setose with thick-based hairs. Thus, of the relatively small but significant representation before me 14 sheets (including all from south of lat. 38°) from Virginia have setose upper surfaces, only 2 (both from north of lat. 38° 30′) have them glabrous; 8 (all but 2 from the outer Piedmont or the Coastal Plain) from North Carolina have setose upper surfaces, 7 (all from the mountains) not; 3 from South Carolina setose, 0 glabrous; 5 from Georgia setose, 1 (from Pine Mt.) glabrous; and all from Missouri setose. The setose upper surface, as opposed to the esetose one, seems to mark a real geographic variation. In view of the fact that all our collections from the regions best known to Banister (and through him Plukenet) and to Clayton (and through him Gronovius) have the setose upper surfaces ("foliis . . . hirtis—*Gronovius;* "Folia *tenuitate membranacea, supra pilis raris adspersa*"—*Linnaeus*), I am treating the common plant of southeastern Virginia as typical of the species as recognized by Willdenow and by Torrey & Gray and later authors.

Michaux did not even recognize *Hieracium venosum*. He lumped the two very different plants, one with elongate subcylindric inflorescences, thick green foliage and stoutish stems, the other with open corymbiform panicle, often purple-marked

membranous foliage and slender stems as *H. Gronovii*. Under that inclusive name he had two varieties:

Var. α. *nudicaule:* caule subunifoliato: panicula subfastigiata.
— β. *foliosum:* caule parce folioso: panicula oblonga.
HAB. β. in Virginia et Carolina.
— α. in Canada et Pensylvania.

The photograph of Michaux's material which I took in 1903 shows the two plants: his *H. Gronovii*, α. *nudicaule*, the common northern extreme of *H. venosum* with leaves glabrous above. The label bears the annotation "État de N. York et Pensylvanie" and the significant note: "calyce pedunculisq. hispidis", which places it perilously near "var. *Blombergii*"!, so that the latter name must lapse with those who think the more glandular specimens worth sorting out. *H. Gronovii*, var. *foliosum* Michx. is very characteristic *H. Gronovii* as now generally interpreted, the plant with 2–10 well developed and scattered cauline leaves. The occasional more leafy individuals, with 20–30 cauline leaves seem not worth separating, at least, they are not var. *foliosum*.

The highly plastic series of plants known as *Hieracium marianum* Willd. seems to be a group of more or less perpetuating hybrids with *H. venosum* as one parent, *H. Gronovii* often, or northward *H. scabrum* Michx., as the other. The resultant maze is very complex. It is our nearest approach to the baffling series of apomicts and mixed progeny with which the European students of *Hieracium* are familiar.

Photo. B. G. Schubert

MUHLENBERGIA FRONDOSA (M. FOLIOSA): FIGS. 1-3, fragments of type of AGROSTIS FOLIOSA, × 5; FIG. 4, spikelets, × 4; FIG. 5, floret, × 10; FIG. 6, grain, × 10.

Photo. B. G. Schubert.

MUHLENBERGIA FRONDOSA: FIG. 1, characteristic decumbent branch, × 1/3; FIG. 2, characteristic glabrous internode, open and compressed sheath and partly included panicle, × 5; FIG. 3, portion of rhizome, × 4.

Photo. B. G. Schubert.

MUHLENBERGIA MEXICANA: FIG. 1, type of AGROSTIS MEXICANA, × ½; FIG. 2, portion of panicle of type, × 5; FIG. 3, spikelets, × 10.

Photo. B. G. Schubert.

MUHLENBERGIA MEXICANA: FIG. 1, Jacquin's plate of AGROSTIS MEXICANA, $\times \frac{2}{5}$; FIG. 2, summit of puberulent and opaque internode and node and base of sheath, $\times$ 5, from Massachusetts; FIG. 3, floret, $\times$ 10, from Quebec; FIG. 4, grain, $\times$ 10, from New Jersey.

Photo. B. G. Schubert.

MUHLENBERGIA RACEMOSA: FIG. 1 (2 branches), type of *Agrostis racemosa*, × 1½; FIG. 2, panicle, × 1, from Illinois; FIG. 3, panicle, × 1, from Illinois; FIG. 4, spikelet, × 10, from Minnesota; FIG. 5, floret, × 10, from Minnesota; FIG. 6, grain, × 10, from Illinois.

Photo. B. G. Schubert.

MUHLENBERGIA RACEMOSA: FIG. 1, characteristic summit of plant, × 1, from Minnesota; FIG. 2, summit of glabrous and lustrous internode and node and base of sheath, × 5, from Wisconsin; FIG. 3, portion of panicle to show characteristic small anthers, × 4, from Illinois.

Photo. B. G. Schubert.

MUHLENBERGIA SETOSA: FIG. 1, type of POLYPOGON SETOSUS, × 1⅓; FIG. 2, panicle, × 1, from Massachusetts; FIG. 3, panicle, × 1, from Pennsylvania; FIG. 4, portion of rhizome, × 4, from Nova Scotia; FIG. 5, portion of panicle to show characteristic long anthers, × 4, from Massachusetts; FIG. 6, spikelets, × 10, from Massachusetts; floret showing basal villi, × 10, from Pennsylvania; FIG. 8, grain, × 10, from Pennsylvania.

Photo. B. G. Schubert.

MUHLENBERGIA SETOSA (M. GLOMERATA): FIG. 1, type of POLYPOGON GLOMERATUS, × ⅓; FIG. 2, characteristic opaque and puberulent internode and node and base of sheath, × 5, from Pennsylvania.

Photo. B. G. Schubert.

MUHLENBERGIA SETOSA, var. CINNOIDES: FIG. 1, type of DACTYLOGRAMMA CINNOIDES, × 1/3; FIG. 2, panicle, × 1, from Newfoundland; FIG. 3, portion of panicle to show elongate anthers, × 4, from Maine; FIG. 4, floret to show villi running high on lemma, × 10, from Newfoundland; FIG. 5, grain, × 10, from Quebec.

Photo. B. G. Schubert.

ERIANTHUS COARCTATUS: FIG. 1, type, × $^2/_5$; FIG. 2, panicle, × 1; FIG. 3, summit of rachis of raceme, × 3; FIG. 4, spikelet, × 3; FIG. 5, spikelet, × 6.

Photo. B. G. Schubert.

ERIANTHUS BREVIBARBIS: FIG. 1, type, × 1/2; FIG. 2, spikelets of type, × 1 1/2; FIG. 3, spikelet, × 6, from Arkansas.

Photo. B. G. Schubert.

ERIANTHUS BREVIBARBIS: FIG. 1, plant, × ½, from Arkansas; FIG. 2, summit of rachis of raceme, × 3; FIG. 3, spikelet, × 3.

Photo. B. G. Schubert.

ERIANTHUS ALOPECUROIDES: FIG. 1, type of ANDROPOGON ALOPECUROIDES, × ½; FIG. 2, tip of same, × 3.

ANDROPOGON DIVARICATUM: FIG. 3, type, × ⅗; FIG. 4, portion of same, × 2; FIG. 5, paratype, *Clayton*, no. 600, × ½.

Photo. B. G. Schubert.

SCIRPUS PUMILUS: FIG. 1, habit, × 1; FIGS. 2–4, spikelet, × 4; FIG. 5, disintegrated spikelet, showing broad scarious margin of scale, × 10; FIG. 6, achene and its cross-section, after *Schroeter:* FIGS. 7 and 8, achenes, × 10; FIG. 9, looking down upon summit of achene, × 10.

Photo. B. G. Schubert.

SCIRPUS EMERGENS: FIG. 1, topotype, × 1; FIG. 2, spikelet, × 10, FIG. 3, disintegrated spikelet, showing firm scales, × 10; FIG. 4, achene, × 10; FIG. 5, looking down upon summit of achene, × 10.

S. RUFUS: FIG. 6, achenes, × 10.

S. RUFUS, var. NEOGAEUS: achenes, × 10.

Photo. B. G. Schubert

SCIRPUS ROLLANDII: FIG. 1, type, × 1; FIGS. 2 and 3, spikelets of type, × 10; FIG. 4, disintegrated spikelet from type, showing anthers, × 10; FIGS. 5–8, achenes, × 10; FIGS. 8–10, looking down upon summits of achenes, showing plano-convex outline. × 10.

Photo. B. G. Schubert.

SCIRPUS VALIDUS: FIG. 1, inflorescence, × 1; FIG. 2, spikelet, × 5; FIG. 3, achene and elongate bristles, × 10.

Var. CREBER: FIG. 4, inflorescence of type, × 1; FIG. 5, mature spikelets, showing protruding achenes, × 5; FIG 6, flowering spikelets, × 5; FIG. 7, achene and subequal bristles, × 10.

Var. CREBER, FORMA MEGASTACHYUS: FIG. 8, inflorescence of type, × 1.

Photo. B. G. Schubert.

SCIRPUS STEINMETZII, all figs. from type: FIG. 1, inflorescences, × 1; FIG. 2, axis of inflorescence, × 3; FIGS. 3 and 4, spikelets, × 5; FIGS. 5 and 6, achenes, each with single bristle, × 10; FIG. 7, achene viewed from above, × 10.

S. HETEROCHAETUS: FIG. 8, spikelets, × 5; FIG. 9, achene, × 10; FIG. 10, achenes viewed from above, × 10.

Photo. B. G. Schubert

SCIRPUS EXPANSUS, all figs. from type: FIG. 1, inflorescence, × $\frac{2}{5}$; FIG. 2, portion of inflorescence, × 3; FIG. 3, spikelets, with anthers, × 10.

S. SYLVATICUS: FIG. 4, small portion of inflorescence, × 3; FIG. 5, spikelets, with anthers, × 10.

Photo. M. L. Fernald.

Type of ANGELICA TRIQUINATA Michx., × ½.

Photo. B. G. Schubert.

ANGELICA TRIQUINATA Michx: portion of plant, × ½, of *A. Curtisii* Buckley.

INDEX

New scientific names are printed in full-face type

Agrostis filiformis, 228, 230, 236; filiformis α., 230, β., 230; foliosa, 223, 229, 230, 235, 238, pl. 749, forma ambigua, 230; frondosa, 228–230, 235, 238, pls. 749, 750; lateriflora, 226, 227, var. filiformis, 236; mexicana, 223–226, 228, 236, 238, pls. 751, 752; racemosa, 231, 235, 237, 238, pl. 753; setosa, 237

Alopecurus glomeratus, 237

American Representative of Scirpus pumilus, The, 279, pls. 762–764

Andropogon alopecuroides, 250–252, 255, pl. 761; divaricatum, 252–255, pl. 761; furcatus, 255, 256, 258; Gerardi, 256, 258, Why not, ?, 255, var. **chrysocomus, 258,** var. **paucipilis, 258;** nutans, 252–255; provinciale, 256; provincialis, 255–258, var. chrysocomus, 258, subvar. furcatus, 257, subvar. genuinus, 257, var. paucipilis, 258; spica digitatis, etc., 255; virginicum, 252

Andropogoneae, 248, 254, 256

Angelica, 299; atropurpurea, 298, 299; Curtisii, 298, 300; hirsuta, 298, 300, 301; hirsuta triquinata, 298; triquinata, 298–301, What is, ?, 298–301; **venenosa, 301;** villosa, 298, 300, 301

Anthoxanthum, 250; giganteum, 249–251

Archangelica hirsuta, 301

Avena glumosa, 242; spicata, 242

Blysmus rufus, 287

Carex, 241

Cassia Chamaecrista, 302

Cicuta venenata, 300; venenosa, 300–302

Cinna, 227, 234; filiformis, 236; glomerata, 237; lateriflora. 226, 227; racemosa, 237

Chloris, 257

Chrysopogon Elliottii, 255

Dactylogramma, 234; cinnoides, 232, 234, 239, pl. 757

Danthonia, 239, 254, Notes on, 239–246; Alleni, 240–242, 244, 245; compressa, 239–242, 245; Faxoni, 241, 244, 245; glumosa, 242; intermedia, 240; pinetorum, 243; sericea, 240, 245; spicata, 239–243, var. compressa, 245, var. longipila, 240, 242, 244; spicata pinetorum, 243, var. pinetorum, 240, 242, 243, var. **typica, 242,** var. villosa, 240, 243; thermalis, 243

Eleocharis pauciflora, var. Fernaldii, 280

Erianthus, 249, 250, 255; alopecuroides, 249, 251, 252, 254, 255, pl. 761, var. brevibarbis, 246; brevibarbis, 246–250, 255, pls. 759, 760, and other Species, 246; **coarctatus, 246**–249, 255, **pl. 758,** var. **Elliottianus, 246,** 248; compactus, 249, 251, 252; divaricatus, 252, 255, pl. 761; giganteus, 249–251; saccharoides, 249–252, subsp. brevibarbis, 248, var. **compactus, 252;** strictus, 249

Ferula villosa, 298–301

Five common Rhizomatous Species of Muhlenbergia, 221–239, pls. 749–757

Gramen dactylon, villosum, etc., 255

Gramineae, 222, 248

Greenway, Memorandum regarding James, 301

Greenwaya, 304

Hieracium, 325, Notes on, 317–325; Sect. Vulgata, 317–319; auratum, 321; canadense, 320–322, [subsp.] columbianum, 321, var. columbianum, 320, 321, var. **fasciculatum, 320**–322, var. hirtirameum, 321, 322, var. latifolium, 321, var. macrophyllum, 321; columbianum, 320, 321; fasciculatum, 320; groenlandicum, 318, 319; Gronovii, 323, 325, var. foliosum, 325, var. β. foliosum, 325, var. α. nudicaule, 323, 325; Kalmii, 322; laevigatum, subsp. canadense, 321; macrophyllum, 320, 321; marianum, 325; molle, 318; murorum, 319; **Robinsonii, 317**–319; sabaudum, 322; scabrum, 325; smolandicum, 317, subsp. Robinsonii, 317; venosum, 323–325, var. Blombergii, 323–325, var. nudicaule, 323, var. β. subcaulescens, 323; virgatum, 321, 322; vulgatum, 317–319

Identity of Scleria setacea of Poiret, The, 296
Isolepis oligantha, 280

Juncus canadensis, 295

Marsh Muhly, 222, 223, 231
Memorandum regarding James Greenway, 301
Merathrepta compressa, 245; pinetorum, 243; spicata, 242; thermalis, 243, var. pinetorum, 243
Muhlenbergia, 221, 223, 226, 229, 235, 255, Five Common Rhizomatous Species of, 221–239, pls. 749–757; ambigua, 236, var. filiformis, 236; calycina, 237; commutata, 235; foliosa, 221, 222, 224, 226, 228, 229, 235, 236; foliosa ambigua, 236, forma ambigua, 236; foliosa setiglumis, 236; **frondosa, 235,** pls. 749, 750, forma **commutata, 235;** glabrifolia, 227; glomerata, 231, 232, 234, 237, 239, var. ramosa, 231, 232, 237; lateriflora, 226, 227; mexicana, 221, 223, 224, 226, 227–230, 235, 236, 238, pls. 751, 752, forma **ambigua, 236;** mexicana commutata, 235, forma commutata, 236, var. commutata, 235; mexicana filiformis, 236, forma setiglumis, 236; racemosa, 221, 222, 224, 231, 232, 237, 238, pls. 753, 754, var. ramosa, 237; setiglumis, 236; setosa, 222, 231–233, 235, 237–239, pls. 755, 756, var. **cinnoides,** 233, **238,** 239, pl. 757; sylvatica, 221, 222, 224, 230, 231, 235, 237, var. **robusta, 236,** 237, var. setiglumis, 236
Muhly, 223, Marsh, 222, 223, 231; Wire-stem, 223
Muley, 222

Notes on Danthonia, 239–246; on Hieracium, 317–325

Pastinaca triquinata, 299, 301
Pentameris compressa, 245; spicata, 243; thermalis, 243
Podosaemum glomeratum, 237
Polypogon glomeratus, 232, 234, 237, 239, pl. 756; racemosus, 237; setosus, 234, 235, 237, 238, pl. 755

Rhizomatous Species of Muhlenbergia, Five Common, 221–239, pls. 749–757
Rhynchospora, 297; setacea, 297

Saccharum, 248
Schoenus setaceus, 297
Scirpus § Baeothryon, 279; § Lacustres, 285, Some North American Members of, 283, pls. 765, 766; acutus, 284, 285; alpinus, 279, 280; atrovirens, var. georgianus, forma **angustispicatus, 296,** forma **cephalanthus, 296;** campestris, 291, var. Fernaldi, 290, var. novae-angliae, 288, 290; **emergens, 281,** 283, pl. 763; **expansus, 293**–295, **pl. 767,** forma **Bissellii, 294,** 295, forma **globulosus, 294;** Fernaldi, 289, 290; heterochaetus, 286, 287, pl. 766; lacustris, var. condensatus, 285; lacustris condensatus, 285, 286; maritimus, 289–291, var. digynus, 291, var. Fernaldi, 289–292, forma **agonus, 288,** 289, 291; microcarpus, 295, var. Bissellii, 294; novae-angliae, 289–291; orgyalis, 285; paludosus, 291, 292, var. **atlanticus, 291,** 292; pauciflorus, 280; planifolius, 279; polyphyllus, forma **macrostachys, 296,** var. macrostachys, 296; pumilus, 279–282, pl. 762, The American Representative of, 279, pls. 762–764; robustus, 290, var. novae-angliae, 290; (§ Baeothyron) **Rollandii, 282, pl. 764;** rubrotinctus, 295, forma **radiosus, 295;** rufus, 283, 287, 288, var. **neogaeus,** 283, **287,** 288, **pl. 763;** Some American Species and Varieties of, 287, pls. 763, 767; **Steinmetzii, 286,** 287, **pl. 766;** Studies in North American Species of, 279–296; subterminalis, forma **terrestris, 288,** var. terrestris, 288; sylvaticus, 293–295, pl. 767, forma Bissellii, 294, var. Bissellii, 294; validus, 284–287, pl. 765, var. **creber, 283,** 284, 287, **pl. 765,** forma **megastachyus, 283,** 285, 287, **pl. 765**
Scleria, 296, 297; Brittonii, 297; georgiana, 297; laxa, 296; Muhlenbergii, 296, 297; reticularis, 296; setacea, 297, of Poiret, The Identity of, 296; Torreyana, 296
Some American Species and Varieties of Scirpus, 287, pls. 763, 767; North American Members of Scirpus, § Lacustres, 283, pls. 765, 766
Sorghastrum Elliottii, 253–255, pl. 761; Linnaeanum, 252, 253; nutans, 252–255

Sorghum nutans, 253, subsp. Linnaeanum, 253
Studies in North American Species of Scirpus, 279–296

Trichochloa calycina, 237; glomerata, 237
Trichophorum emergens, 281

Umbelliferae, 300

Vilfa, 227

What is Angelica triquinata?, 298–301
Why not Andropogon Gerardi?, 255–258
Wire-stem Muhly, 223

Reprinted from RHODORA, Vol. 45, October–December, 1943

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VIRGINIAN BOTANIZING UNDER RESTRICTIONS

M. L. FERNALD

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VIRGINIAN BOTANIZING UNDER RESTRICTIONS

M. L. Fernald

(Plates 770–806)

Part I. Field-Studies of 1942 and 1943

At the approach of spring in New England in 1942 my former student, Professor Ernst C. Abbe of the University of Minnesota, then spending a year in research at the Gray Herbarium, was persuaded without too much pressure to contribute the use of his new Ford and to join Mr. Bayard Long and me for a short period of botanizing in southeastern Virginia. The need to go at once to the region arose through the pressure for housing near Camp Lee, with the result that our former headquarters at Century House, south of Petersburg, had been wholly taken over by Army officers and our great stock of driers, ventilators, press-frames, tramping clothes, etc. had been temporarily stored in a shed. There was no place left near Petersburg for such unessential people as mere botanists and we would have to move.

Abbe and I drove from Cambridge, with spring still far in the offing, and on the afternoon of April 15th called in at Elkins Park for Long and, taking a thinly settled route (via Glen Burnie, LaPlata and Port Conway) out of Baltimore, reached Fredericksburg for the night. Starting from Fredericksburg on the morning of the 16th we decided to drive down the north side of the Rappahannock to the Port Conway-Port Royal bridge,

thence to Petersburg. We might thus add something to the *Checklist of Plants of the Washington-Baltimore Area,* which covers the region south to the Rappahannock. About three miles southeast of Falmouth we were attracted by a brook cutting a ravine through the woods and by the conspicuous display of such plants now in flower or fruit as *Arabis laevigata, Stellaria pubera* and *Corydalis flavula.* Parking just off the road at the eastern end of the bridge we stepped into a colony of *Ranunculus abortivus* var. *indivisus* Fernald in Rhodora, xl. 418, pl. 518 (1938), the extreme of the species characteristic of bottomland woods of the Nottoway, ninety miles to the south; and when, a little farther on, we were puzzled by the *Cerastium* of the roadside-fill and found it to be the European *C. brachypetalum* Desportes, which has been known in America only from roadsides of Southampton County, Virginia, we felt that we were promptly getting into stride. But we were obligated to reach Petersburg and to move our collecting equipment to new quarters. Our chief concern was not the Washington-Baltimore Flora.

In the autumn of 1941 we had found not very far down river from Port Royal a fine bank of naturalized trees and shrubs and we wanted to secure flowering material of *Vinca major* L., which abounds there. So we took a little time to drive out to the home of Mr. and Mrs. Snowden on the river-bluff northwest of Return. After a visit with our hosts we reëxamined the colony of naturalized species along the river[1] and among them, unnoted the autumn before, there were *Ulmus procera* Salisb., the English Elm, and the American *Philadelphus inodorus* L. Then we went to the woods northeast of Loretto where, the preceding October, *Poncirus trifoliata* (L.) Raf. was fruiting[2], hoping to get good flowering material. Luck was still with us, the shrubs being in the prime of flowering. Since the day was rapidly passing we then decided to drive from Tappahannock without stop to Petersburg. We did pretty well, stopping first for a few moments to look into a wet woodland glade where we found two species rare in southeastern Virginia, *Viola cucullata* and *Symplocarpus foetidus;* but when we came to the broad, green, wooded bottomland of the Pamunkey, slightly north of Old Church, we had to get out for just a peep. The usual plants of such habitats

[1] See Rhodora, xliv. 372 (1942). [2] Rhodora, l. c.

were there, *Clematis crispa*, *Cardamine bulbosa*, and a perplexing member of the *Ranunculus hispidus*-series, and with them *Viola pensylvanica* Michx.[1], rare on the Coastal Plain. The great surprise, however, was acres and acres, as if native, of splendid flowering clumps[2] of the Old World Summer Snowflake, *Leucojum aestivum* L., as thoroughly at home as any squatter and making a display which we shall never forget.

While we were busily exploring this bottomland we heard excited voices of Negroes and the hurrying of feet on the road near by; and when we came up from the woods, a man, sauntering quietly along the road, waited for us to greet him and to explain our strange doings. The colored women had rushed excitedly to his filling-station to report three terrible monsters down on the bottomland across the river, one of them with an axe (my little hand-pick), one with a can of dynamite (vasculum), the third with a big pack on his back (Long's field-press). The women had "runned and runned and runned" and were completely out of breath and greatly frightened. Thus the three devotees of what Linnaeus called "our guileless science" were unconsciously starting the reputation which it became difficult to live down in succeeding days in Virginia. The proprietor of the gasoline-station told us of the vast extent of the bottomland-woods, of the fresh tidal flats near by and of his readiness to guide us about the region, and we promptly arranged to employ him and his motor-boat in midsummer and autumn, then little realizing that midsummers and autumns would pass before we should again see the Pamunkey.

The roadside-fill (soft shoulder) near where we had parked the car was carpeted with two wanderers from Europe, *Teesdalia nudicaulis* (L.) R. Br. which we had only once found in the state (on a fill in Sussex County) and *Holosteum umbellatum* which we subsequently saw in other such habitats. The large number of Europeans suddenly appearing on these recently made soft shoulders (these, *Cerastium brachypetalum*, *C. tetrandrum* Curtis, and other European species) make one wonder about the source of seed sown on the soft shoulders of new roads in eastern Virginia.

[1] See Rhodora, xliii. 500 and 616 (1941).
[2] See Rhodora, xliv. 390 (1942).

Six or eight miles below Petersburg we found a place to sleep—in cabins where they were asking and getting $4.00 a night for each bed over the week-ends from families visiting loyal sons and brothers at Camp Lee, twelve miles away. There were no "ceilings" on cabins. Only as a special concession were we taken in on a Friday night, for the cabins were being rented only Saturday and Sunday nights during the activity at Camp Lee. Finding next morning that the Petersburg region was no longer available as a home, we decided to try Waverly, twenty-five miles to the southeast, a village in the center of good botanizing ground and at the junction of good roads. We had formerly enjoyed the hospitality there of Mrs. Carter and her daughter, Mrs. Fleetwood, in their large old house, and we decided to try there; but Mrs. Fleetwood, we promptly learned, was at Fort Eustis as hostess and the old house was occupied by the family of an Army officer, who was forced daily to make the trip to and from Camp Lee. Southeastern Virginia was in the hands of the Army. Happily, our friend, Mrs. Calvin Horn, who, with her husband, runs an automobile- and gasoline-station at Waverly, was able to suggest a new home and in the evening we were established in the roomy and comfortable house of Mr. and Mrs. James Thompson and our equipment was stacked and ready for use.

Promptly after breakfast on the 17th we started eastward to take a cross-road north to the James River. Only a few rods outside the village Abbe spied a fine colony of *Iris verna* in beautiful flower. It must be photographed. For three minutes he tested light and distance, with his camera pointing down to the innocent *Iris*, passing cars slowing down to watch the proceedings. Then we went on to the James River, visiting then and two days later areas above Claremont, at Claremont Ferry and at Burwell's Bay below Rushmere, and introducing Abbe to the complexities of the eastern Crabapples, now in bloom, and to such fine natives as *Cardamine Douglassii* and *Sedum ternatum*. On the weedy and turfy shore at Burwell's Bay the little *Stellaria media* var. *glaberrima* G. Beck[1] made carpets with *Ranunculus parviflorus* and we here extended the range inland from the outer coast of the odorless, onion-like *Nothoscordum bivalve*.

[1] See Rhodora, xlii. 451 (1940).

We were specially anxious to show Abbe the big white-flowered *Erigeron scaturicola* Fernald in Rhodora, xliii. 524 and 654, pl. 695 (1941), which grows in the deep and viscid, dripping wet lime-marl under the crest of the bluff west of Burwell's Bay. We found typical *E. philadelphicus* on the beach, then plants like small *E. scaturicola* but with pink, instead of white, rays began to appear and finally, high up under the dipping crest, just where a magnificent mass of white-rayed *E. scaturicola* had formerly grown, there was an equally vigorous clump of plants with deep pink ligules. It was difficult to believe and I, naturally, wanted to get rooting specimens. These, after he had slipped back several times on the wet marl, Abbe dug and threw down. White-rayed *E. scaturicola* was now pink! The dry material was stored in a pigeon-hole to await critical study and nine months later, when reëxamined, its rays were all white. The smaller and more typical *E. philadelphicus* has retained, as usual, the bright pink of its ligules. Again, ho-hum! *E. scaturicola* is, presumably, a physiological variant of *E. philadelphicus*, induced by the concentrated calcium solution and cold water in which it grows. This is the view of Mr. Arthur Cronquist who is studying the genus. Whereas *Aster* is reputed to be hopelessly plastic and inconstant, *Erigeron* is usually well behaved. The "strong waters" along the bluffs of the James have there evidently "gone to the head"s of one member of the relatively conservative genus. It would be instructive to feed ordinary and typical *E. philadelphicus* for some years on refrigerated lime-water.

On the way back to Waverly on the following Monday, as we crossed Cypress Swamp north of Dendron, we stopped to collect typical *Senecio aureus* in the bottomland-woods and as we came back to the car there, at the upper border of the bottomland, we saw a row of plants combining in different degrees the habit and traits of *S. aureus* with those of the very definite and wholly different *S. tomentosus* which was flowering in the drier open areas. It was clear that *S. aureus* and *S. tomentosus* sometimes cross, and Long and I immediately remembered a single colony on a bottomland west of Claremont which we had hopefully identified with *S. Crawfordii*[1]. Was it possible that that, too, was a hybrid? As I shall later show, it is. We thus returned

[1] See Rhodora, xliii. 521 and 657 (1941).

to Waverly at dark, after happy initial days but with some pretty baffling problems in mind and the first evening there we immediately met the greatest problem of all.

When we parked the car outside the café, I promptly went in and sat at a table, but I was soon puzzled because Long and Abbe did not come in. Finally Long appeared at the door and mysteriously beckoned. When I went out, wondering at his action, he met me with the query, "Have you got your credentials? We're pinched." "Why?" I asked. "Because Abbe took a photograph." My credentials (an identification-letter from the President of Harvard University; a letter from the Secretary of the National Academy of Sciences emphasizing that as a member I was a scientific advisor to the federal government; a letter addressed to me as President of the Botanical Society of America; a newspaper-clipping with a picture of me as recipient of a medal, in part for the botanical explorations in Virginia; and a passport with portrait) and my statements regarding the distinguished American forebears of both Long and Abbe promptly convinced the police that we were not, as supposed, German spies who had crossed the Atlantic and had sought out the small village of Waverly for destruction. In the morning when little *Iris verna* was being photographed a zealous Waverly citizen, unacquainted with any such interest as that, had telephoned to State Police headquarters in Richmond of the "furrin" car (from Minnesota) with three "spies" who were photographing the Norfolk and Western railroad-tracks, the Texaco oil-tank and other vital landmarks of the community, for it did not occur to him that our backs were toward the unsightly railroad, with the small oil-tank farther in the background, that the camera was pointed exactly away from those significant objects at something on the ground and that our small botanizing pick (see PLATE 770) was not the implement to use in ripping up the heavy steel rails of the Norfolk and Western. Telephone conversation with the motor-registry in Minneapolis revealed that the car belonged to Professor Abbe, with the incriminating given name Ernst. Radio calls had gone all over southeastern Virginia for all officers to halt our car; and all day long we had innocently driven on the Suffolk turnpike (U. S. Route 460), on the road from near Wakefield to Surry Courthouse (Route 31),

on the Richmond-Smithfield road (Route 10) or on the road from Claremont to Waverly and far beyond, across the state (Route 40). We did not know that we were reputed German spies and that the State Police were watching for us. When we got back to our new home Mrs. Thompson was, naturally, upset. Her husband, the village barber, had come home to noon dinner with the tale, much amplified in the barber-shop, of the terrible mess they had got into, "harboring German spies"; but my documents and the realization that Long and I had for several years known Mrs. Horn, Mrs. Carter and Mrs. Fleetwood, and had more than once been guests at the latters' home, and had regularly stopped in Waverly for meals during several years of botanizing, cleared the atmosphere. Nevertheless, next day some ladies from the other end of the town came to Mrs. Thompson to commiserate. They "hadn't slept a wink, expecting to be murdered in their beds", etc., etc. Thus our début at Waverly was even more horrifying than our appearance on the bottomland of the Pamunkey, and half-jesting, half-serious questions through this trip and on Long's and my June-July trip indicated that the first impression of us "furriners" was still in people's minds. We had become used to being "damn Yankees"; Long and I had once been arrested in Richmond as "German spies" (see RHODORA, xliii. 516); but it was a novel experience to be called "furriners". The people of Waverly are typical Virginians and, consequently, strongly for the "New Deal". They avoided addressing any such obvious heretics as we as "Professor". Baldness having advanced on all of us, we, perhaps, did not fulfill their conception of "long-haired professors". Since I know of no published photograph of *Iris verna* in its native habitat the photograph which so upset the equilibrium of southeastern Virginia and which somewhat "cramped our style" is here presented, as they say in all criminal cases, as exhibit A (PLATE 770).

Desiring to secure in flower the remarkable variations of *Acer floridanum* (Chapm.) Pax near Grove Landing, below Williamsburg, which were discussed and illustrated in RHODORA, xliv. pp. 359, 360, 426–428 and plates 725–727 (1942), and hoping to make the field-acquaintance of *Monotropsis odorata*, one of the Williamsburg specialties, we went on Sunday to William and

Mary as the guests of my former student and Abbe's friend of student days, Professor Albert L. Delisle, and in the afternoon we made a pretty thorough canvas of the *Acer* problem. That has already been reported upon, but when we came to a tree with the trunk more than 4 feet in diameter and with its great sheets of exfoliating whitish bark flapping like those of shagbark-hickory we could not help mourning our inability to get a photograph of it. The herbaceous plants of this rich forest were noted a year ago. To that list should be added *Nothoscordum bivalve* which the day before we had got on the opposite side of the James. After supper Delisle's student, a keen searcher for and discoverer of rare plants, Mr. Kenneth Winfield, took us to his station for *Monotropsis*. It was necessary for him to show us the first clump of slightly too mature plants; after that we found more and more. This aromatic saprophyte really abounded. Its favorite habitat was in the leaf-mold in the shelter of fallen and decaying logs. We thought we had learned how to find it but later searches on similar slopes elsewhere were fruitless.

In April, 1926, Dr. Paul A. Warren collected in the Great Dismal Swamp a dwarf *Trillium* which I had misidentified as the extreme southern *T. lanceolatum* Boykin but which is not satisfactorily referable to that species. Its sessile flowers easily lead to *T. lanceolatum* but in other characters it is near *T. pusillum* Michx., a species with peduncled flowers. Dr. Warren and a party of students from William and Mary had walked in on the old path from Wallaceton to Lake Drummond. The path now being obliterated by dense growth and by tangles of briers following forest-fire, we went in search of the *Trillium* via the Feeder Ditch in Capt. Crockett's motor-boat. The search was futile but the excursion delightful and when we came back from Lake Drummond to the Federal dam, the engineer, Mr. Cherry, asked what particular plant we were seeking. When I described it he promptly said: "I never saw it but once, on a hillside covered with beech-trees where it abounded when I was a boy". His explicit directions took us back to the beech-slope described, near Deep Creek, now a picnic-ground, trampled and scraped and with no *Trillium* left. Most fortunately, however, Mrs. Laura H. Lippitt of Dinwiddie has a good station for the plant and the beautifully prepared specimens she has sent me and others

loaned me by Professor Smart of the University of Richmond enable me to describe and illustrate (PLATE 773, FIGS. 1 and 2) this endemic Virginian *Trillium*.

The season was too early for many novelties, though on succeeding days we extended some local ranges and renewed our acquaintance with numerous vernal species, but nothing significant enough for special note was collected.

Unfortunately, when we could next get away Long and I had to go without Abbe. We reached Waverly in the afternoon of June 28th and, beginning early on the 29th, we had all we could handle until obliged to leave on the morning of July 8th. Mr. Horn was able to supply a pick-up truck to transport our equipment and he found a very efficient driver and helper for us, Lennie Watts, son of a local police-officer, young, full of activity and interest and as effective a driver on back roads as our best drivers of other years. Only three of our old stations were specially revisited. We did not let ourselves be lured to the marl-bluffs of the lower James or north of that river and we did not get down to Greensville County or the pine barrens of southeastern Southampton and southwestern Nansemond. Gasoline was becoming scarce and must be stretched to cover all mileage possible, but we had a careful driver and an efficient truck and Mr. Horn kept it up to full effectiveness.

Nearly west of Waverly we went as far as McKenney in Dinwiddie County. In October of 1941 we had found just east of McKenney an area of low woods and clearings where typical Coastal Plain plants (*Helianthus angustifolius*, *Cirsium virginianum*, and *Solidago perlonga* Fern.) extended well back into the Piedmont and mingled with eastern colonies of upland types such as *Viburnum Rafinesquianum* Schultes. There, too, were the second station north of northwestern Georgia of *Gentiana cherokeensis* (W. P. Lemmon) Fern. and the third station in the state for the characteristic species of prairies of the Interior (Indiana to Texas), *Muhlenbergia brachyphylla* Bush. Such a complex area demands exploration through the summer and autumn and on the 1st of July it was up to its October standard. *Viburnum Rafinesquianum* was more abundant than we remembered; the local *Phlox carolina* L., var. *triflora* (Michx.) Wherry shared a low clearing with *Vicia caroliniana*, *Thalictrum re-*

volutum, *Scleria oligantha* and other rather local species not seen in October. The ditch bordering the woods was the home of *Polygala sanguinea* (rare in southeastern Virginia) and *Rhexia ventricosa* Fern. & Griscom in Rhodora, xxxvii. 192, pl. 346 (1935), its range extended inland, and the *Oenothera* looked, as they so often do, a little strange. A couple of pieces were taken for checking. Next time we will get more, for it is *Oe. tetragona* Roth, var. *riparia* (Nutt.) Munz in Bull. Torr. Bot. Cl. lxiv. 302 (1937), known to Munz only from its original region, Cape Fear River at Wilmington, North Carolina, and the Santee River region of South Carolina. We were hot and hungry. So, seeking a shaded spot, we sat down in a colony of the inland, continental *Psoralea psoralioides* (Walt.) Cory, var. *eglandulosa* (Ell.) F. L. Freeman in Rhodora, xxxix. 426 (1937), Miss Freeman's statement of range being: "Higher altitudes of the Southeastern States, in South Carolina and Georgia, ranging westward as far as Texas, thence northward to Ohio, Indiana, Illinois, Missouri and Kansas". This *Psoralea* and the *Oenothera* were as fine a pair as *Muhlenbergia brachyphylla* and *Gentiana cherokeensis*, found here in October. *Solidago perlonga* we had always considered an autumnal species and it was still in good condition here the preceding October, but already precocious individuals were beginning to flower—the species has a flowering period of four months! *Clematis ochroleuca* was here very large, some plants branching at every axil and bearing 8 fruiting heads. Since the classification of the sub-§ *Integrifoliae* of *Clematis*, § *Viorna* has recently depended too much on inconstant vegetative, rather than more stable fruiting characters, I have tried to find the latter in the eastern American species. My results, with plates 776–782, will be found in Part II.

On the way back to Stony Creek we stopped at several inviting spots. Only one may here be noted. The unique and to most botanists very rare *Carex Collinsii* Nutt. (unique in having the teeth of the perigynium abruptly recurved as hooks, thus suggesting the very primitive subantarctic and Asiatic *Uncinia* which has the exserted rachilla abruptly hooked) inhabits cool spring-fed sphagnous carpets in wooded swamps. Since we first detected it in Virginia we had learned to expect it in such habitats. Consequently, when we saw such a deep carpet of sphag-

num in the woods east of Cherry Hill, we investigated. There was *C. Collinsii*, already over-ripe, and with it was true southern *C. venusta* Dewey at a new northern limit.

Three Creek, tributary to the Nottoway, has yielded us more localized specialties than any other small stream in southeastern Virginia. Wherever we have been on its bottomlands and wooded banks, from the fall-line north of Emporia nearly to its mouth, we have got something novel. The Arringdale Sheet of the Topographic Survey indicated good bottomlands at Arringdale and, slightly farther up stream, near Adams Grove. So, having never tried them, we drove from Capron by the dirt road toward Arringdale. Closely watching the topographic sheet, we sought the crossroad to the village which lends its name to that invaluable guide through the country. Nothing but dense thickets and woods could be found. Turning the car we drove back to definite landmarks. Finally, seeing a colored girl coming toward us we waited and, as she came up, asked: "Will you please tell us how to find Arringdale?" "Irene Dale?" she promptly replied. "I've never hearn of her. I know Irene Dunn up the road a ways but I never hearn of Irene Dale." Arringdale has become extinct; its fame is perpetuated only on the contour-sheet!

It was a sweltering day and the thought of plunging through dense thicket in search of sinuous Three Creek was not inviting; so we went on to Adams Grove. As we crouched in the shade of the small bridge there, to keep out of the blazing heat while we ate our lunch, we were able to note around us several extensions of range to the west, pretty closely approaching the fall-line: *Sagittaria Weatherbiana* Fern. in Rhodora, xxxvii. 387, plates 385 and 386, fig. 1 (1935), *Carex Bayardi* Fern. in Rhodora, xliv. 71 (1942) and *Micranthemum umbrosum* (Walt.) Blake, for example; and as we lunched we were impressed with the somewhat "fluffy" aspect of the meagre umbels of the *Sium* at the margin of the Creek. Its foliage, too, was unlike that of the common northern plant, and its slender and flexuous, terete stems were not like the strongly corrugated and usually coarser stems of the plant commonly known as *S. suave* Walt. or *S. cicutaefolium*. This was young flowering material of the species which we had previously collected in fruit on the bottomlands

of the Blackwater and of Fontaine Creek. They all belong to *S. floridanum* Small, known to Small only from a single valley in Florida. It sometimes pays to stop and eat lunch!

We saved up our allotted gasoline until we had enough to reach the region of Northwest River, flowing from the Great Dismal Swamp into Curratuck Sound. There is always something different to be found on the marshes near Northwest or along adjacent North Landing River; it is important to visit them at all seasons. On the way, a little east of Magnolia, white flowers on the surface of one of the big ditches along the highway across the northern end of the Great Dismal Swamp attracted us, and we got out to collect our first material in the region of *Cabomba caroliniana*. As we approached Northwest we were surprised to see a striking and very "different" *Physostegia* bordering Indian Creek. We were quite familiar, on the wooded bottomlands of the Blackwater and the Nottoway, farther inland, with the delicate and thin-leaved *P. denticulata*, but this was a much coarser plant with larger corollas, heavy and subsessile (instead of membranous and long-petioled) leaves and other characters which quickly distinguish it. Unfortunately, the colony was densely enmeshed by *Cuscuta* but we cleaned off enough material to make a good type and in Part II I shall describe and illustrate it (PLATE 783) and attempt to clarify the genus in the "Manual range". Days at intervals of three weeks in a motor-boat along Indian Creek will sometime be very productive. So will days at similar intervals on little Blackwater River near by and, likewise, on Northwest River, both up stream and down to the Carolina line. Furthermore, North Landing River, with its broad savannah-marshes needs similar exploration. There is plenty to do; we have merely glimpsed the easily accessible margins of these areas. On the reed-marsh of Northwest River the always superb orange- and red-flowered *Asclepias lanceolata*, var. *paupercula* (Michx.) Fern. was very handsome and one plant had bright, pale yellow corollas, a pretty color-form. I took the top, Long wistfully remarking, "We'll come again next year for mine". When we are again able, after the "duration", to visit Northwest there may be more than a single yellow-flowered plant. Here's hoping! And if we are there at the right season we may secure better material of the undescribed

Solidago which, when we found it in October of 1941, had been mowed off and was, therefore, not typical. The thicket bordering the marsh is also the home of a new variety of the wide-ranging and variable *Eupatorium rotundifolium*. Whereas typical *E. rotundifolium* has the leaves gently rounded to subtruncate at base, this plant of Northwest River has the unusually large blades deeply cordate, with the bases clasping the densely white-tomentose stem. We afterward found it in a marshy thicket in Southampton County, and Godfrey got the same extreme variety only a few miles to the south, in Bertie County, North Carolina. It will be described and discussed in Part II. Another plant, a very bristly *Stachys*, on the reed-marsh of Northwest River, added to a large series of different members of the genus accumulated during several seasons in southeastern Virginia, has forced me finally to tackle the group. The results, with many illustrations (PLATES 787–794), will be given in Part II.

July 4th, even with restricted gasoline, may be an unsafe day for cautious and virtuous drivers on trunk-routes. So, when Lennie asked if we might keep off the main roads on that day, to avoid drunken drivers, we remembered that there had been extensive lumbering operations in the pine barrens south of Zuni, with the consequent partial clearing of new lumber-roads and the opening to sunshine of formerly shaded areas. That was the place to go. Clearing and disturbing of the soil, while taking the older trees of Long-leaf Pine and many other trees, had certainly stimulated many species and brought others into view. Near one damp, new woodroad *Amianthium Muscaetoxicum*, at a new northern limit in this section of the state, and *Calopogon pallidus* Chapm., its limit of range extended 10¾ miles to the north, stood up bravely in the mossy thicket where they had formerly been hidden, and some clearing-phases of *Panicum* and *Tephrosia* puzzled us. When the habitat has become more stable the *Panicum* may look less unfamiliar. The *Tephrosia* is the glabrescent extreme of *T. virginiana*, which we had found in other pine barrens. It is evidently *T. virginiana*, var. *glabra* Nuttall, described in 1838 from Georgia. It seems to be a well defined variety. In the drier white sand *Bulbostylis ciliatifolius* (Ell.) Fern. had its northeastern limit also slightly extended.

But the greatest display in the recently disturbed sand was of *Euphorbia Ipecacuanhae*. Under normal conditions this hopelessly variable species flowers in early spring (late March into April) but here in the loosened sand it was still in flower and young fruit in early July. Against the suggested explanation that the similar but more upright *E. marilandica* Greene might be a hybrid of tall and erect *E. corollata*, flowering in Virginia from early June to autumn, and depressed and matted *E. Ipecacuanhae* the reply has always been that they cannot hybridize because their flowering periods are so different. The loosened sands south of Zuni dispose of that argument.

At the Blackwater River, near the bridge west of Blackwater School, we established new northern limits for *Asimina parviflora* (Michx.) Dunal and for *Physalis monticola* Mohr, and, crossing the river into Southampton County, we promptly parked the car, for the sandy flat along the river southeast of Unity was very alluring. Most of the plants were of species now known to us but always nice to collect, *Paronychia riparia* Chapm. and *Vaccinium Elliottii* Chapm. at new northeastern limits and some others equally good. The prize here, however, was a large colony of hundreds of uniform plants of a particularly dainty *Ruellia* which, since June of 1941, had worried us. In low, sandy woods at Round Gut on the Nottoway we had then found a colony of *Ruellia*, the mature stems only 2 or 3 inches high, with thin and blunt membranous leaves only 1.5–3 cm. long. The colony was struggling under a pile of brush and had no real chance. So we carefully cleared away the worst obstructions and nursed the colony along, finally to secure a few flowers. Now we have a real station and the plants from it will be the type when a study of *Ruellia* which I now have in progress is completed. Whether it can be finished in time to include in Part II is very doubtful. It is a complex problem, made worse by past inattention to types and original descriptions, and many contradictory interpretations must be reconciled. But the sandy flat southeast of Unity has one member of the genus which we know from Virginia only in Southampton County.

Starting for home, we decided that we could save mileage and time by cutting over to Route 312, from Courtland to Smithfield,

passing through Berlin[1] thence turning off at Ivor for Waverly. On the way we passed roads leading to various ponds which we should have liked to investigate and when we got north of Sedley a little landlocked pond, slightly off our route was too tempting. It was really a small *Cephalanthus*-hole, but in the thicket we promptly detected the new *Eupatorium* of Northwest River. There, also, was *Drosera rotundifolia*, the first we have seen on the Coastal Plain west of the Blackwater, and on a saturated log the very local *Utricularia virgatula* made a close carpet. Driving on to find a good turning-place we came upon Johnson's Millpond. While Lennie was backing and turning the truck we went to the sandy shore. There was *Oldenlandia Boscii* (DC.) Chapman, its range extended 12 miles northward, but in a couple of days we stretched its northern limit more than 12 miles more; and with it *Digitaria serotina* (Walt.) Michx. at its second known station north of the Carolinas. Here too, was *Panicum Wrightianum* Scribn., a species subsequently found on most sandy pond-shores.

Lennie, noting that we had a weakness for pond-shores and marshes, asked next day if we had ever been to Harold's Millpond. We had not, but since in the past most millponds had been fruitless, as artificially dammed branches, and several which we had sought had been abandoned and grown up to cypress- or gum-swamps, we had our doubts. However, we were willing to try. So on the 6th we started for Harold's (on the contour-sheet as Harris) Millpond, southeast of Waverly. It was a dammed-up cypress- and gum-swamp but it was better than most and will stand exploration by boat, for drifted ashore were *Utricularia purpurea*, which we had never met in our Virginia work, and *U. inflata* var. *minor* Chapm. which we had seen only twice. Thus encouraged we decided to try Brittle's Millpond, west of Wakefield. We stuck to the old road, rather than return to the turnpike, and slightly before reaching Brittle's Millpond we investigated a piece of spring-fed sphagnum-carpeted woods. Here the chief interest was centered on a *Xyris*, just coming into flower and not easily matched in the herbarium. It seems to have some distinctive characters but mature material is needed.

[1] Berlin, Baden and Hanover were none of them named in our honor. They were on Virginia maps long before we visited the state.

Brittle's Millpond at once gave us *Panicum Wrightianum* and *Oldenlandia Boscii*, but the shore was not easy to follow and too much punched by the hoofs of grazing animals, so we proceeded southward to see what could be found. And the next pond was a true find.

Suddenly coming into view, Airfield Millpond gave us a real thrill. It had a broad white-sand beach, perhaps 50 feet wide up to the bushes, such a pond as occurs in southeastern North Carolina but such as we had never seen in Virginia. Here we settled down for the rest of the day, until driven out by a thunder-storm and downpour in the afternoon. The rarer pond-shore species of *Panicum*, such as *P. spretum*, were there, the now unmentionable *Oldenlandia* of course, and carpets of all sizes of *Eleocharis microcarpa*, some stranded, some deeply drowned, and so variable in size and in thinness or inflation of culms that we were fooled into imagining it several things. *Paspalum dissectum* gave us a new station, and *Rhynchospora perplexa* Britton lived up to its name. We kept taking it, for on different belts along the beach it looked very different. Dr. Cross (Shirley Gale) says it is all *R. perplexa*, but she admits that the quite different species which abounds on one stretch of beach, where *Drosera capillaris* Poir. is exceptionally stout and fine, is *R. filifolia*, the first known between southeastern North Carolina and Cape May, New Jersey. We at last had found a pond with real sand-beach. Its shoreline is more than 4 miles around and we followed only one tenth of it. *Rhynchospora filifolia* occurred in but one patch a few rods across, the *Drosera* was more restricted, and we saw only one lonely individual of *Styrax americana*. The remaining shore and visits at intervals up to October should yield great returns. Many species unknown north of the Carolinas delight in such a shore.

On our last day we, inevitably, sought more ponds. Protracted drouth had lowered the water and now was the time to investigate. Driving to Windsor we took a road to Collosse, thence to Darden's Pond. There is a swaley and muddy shore but we got nothing surprising. Next we tried Womble's (on the contour-sheet Wade's) Millpond, which is a drowned cypress-swamp. Sometime, with the aid of a boat, it may yield good things, for *Utricularia inflata* var. *minor* is there; so are great

carpets of *U. biflora*. Our greatest prize, however, was *Carex decomposita*, the rare species heretofore known in the state only in cypress-swamps of the lower James. We then moved on to Whitefield's Millpond, southwest of Corinth, and we regretted that we had not found it in the early morning. This was our last day and twilight was approaching, and we had found another pond with a broad sandy beach. Most of the good things of the other ponds were there and we quickly found a colony of *Hypericum denticulatum* Walt., var. *ovalifolium* (Britt.) Blake, one of the most local plants of the state; then *Viola lanceolata*, var. *vittata* (Greene) Weath. & Grisc. and *Proserpinaca intermedia* Mackenzie, the latter the first from south of the James. At one point I shouted "Look, look!" and promptly got an echo. Long saw it too: a little subprostrate plant with filiform stem, lance-oblong leaves and deep blue glomerules, an *Eryngium* of the *prostratum* group, new to Virginia if not to science. Its immature fruits and its sepals do not well match those of the more southern and western *E. prostratum*. This was the last plant collected and we promised ourselves that in three weeks we should get a real series in ripe fruit. Whitefield's Pond is nearly four miles around. We saw one twentieth of the shore and each of the specialties collected was highly localized. Just as with Airfield and with Johnson's the possibilities are great.

Before leaving Waverly we called on the Chairman of the local Rationing Board and were assured that, when we should return in three weeks, we would be granted the necessary gasoline for continuation of our work, gasoline for trucks used in scientific exploration, as he showed us in the regulations, being unrestricted. It would be necessary, however, to write a letter to the Board who would have to vote on the matter. The letter was promptly sent, with return addressed envelope and an air-mail stamp and I proceeded to make a directory of the more than 100 ponds in Tidewater Virginia, most of which we had never seen. By visiting them all we should find a few as good as Whitefield's, Airfield and the Cat Ponds in northern Isle of Wight. A renewed letter to the local Rationing Board, then one to the State Board, then one from an officer of the federal Experiment Station brought no replies and a considerable collection of uncanceled air-mail stamps was being assembled. Perhaps we

were not merely "damn Yankees". Could it be possible that we were still thought of as "German spies"? In Massachusetts I was assured that, if I would hire and take to Virginia a Massachusetts truck, I could have unlimited gasoline. It seemed, however, an unjustifiable waste of gasoline, as well as tires and time, to travel 1200 miles to and from Waverly in order there to purchase gasoline for 500 miles of local scientific research. We are called disloyal if we do not cheerfully accept all the local and contradictory rulings of OPA. Scientific research is what they choose to dictate and the investigators are those they select. If our work were in Florida or some other state we should not be thus penalized for being scientific investigators.

Professor Massey asked us to guide him to definite stations in Tidewater Virginia for the different species of *Vitis*, *Rubus* and other plants of economic importance and all arrangements were made for our joining forces at Waverly and exploring with his federal truck for the practically useful wild species, including those with edible roots, shoots and seeds and those which might furnish fiber and alcohol. We could also get mature material of the little *Eryngium* and other technically interesting plants. Everything was set for productive field-research when Massey, most unhappily, got himself seriously poisoned and hospitalized by digging and cleaning a lot of bulbs of Fly-poison, *Amianthium Muscaetoxicum*, for experimental study.

In the spring of 1942, Mr. John B. Lewis had sent me from the Seward Forest of the University of Virginia at Triplett in Brunswick County a most extraordinary sterile plant of an *Asarum* which seemed to combine traits of true *Asarum*, with superficial, elongate rhizomes, and § *Heterotropa* (the genus *Hexastylis* Raf.). This was accompanied by an invitation for Long and me to go to the Seward Forest to study it and other problems. Finally, in late August, he sent me from the same area *Hypericum setosum* L., one of the most local of Coastal Plain species in Virginia, and perfectly typical *Cynoctonum sessilifolium* (Walt.) J. F. Gmel., the first evidence in the state of this distinctive species, to quote Small's designation, of "Pinelands and wet places, Coastal Plain, Fla. to La." We already knew that in the Seward Forest there is a small relict stand of Long-leaf Pine, 47 miles west of its concentrated area in south-

eastern Virginia. *Hypericum setosum* and *Cynoctonum sessilifolium*, added to *Pinus palustris*, indicated a probable intrusion of Coastal Plain conditions farther back into the Piedmont of southeastern Brunswick County than the one at McKenney in Dinwiddle County, recorded in RHODORA, xliv. 373 (1942) and on a preceding page in this journal. I promptly wrote Mr. Lewis that, as soon as I could arrange for it, I would go to the Seward Forest. I still hoped (in vain) for at least the courtesy of a reply, pro or con, from the Ration Boards I had repeatedly written, since I knew of so many colleagues with all gasoline needed in various southern states for their scientific explorations.

Finally, on the morning of October 10th, I reached Emporia, to be met there by Mr. Lewis. I had written in advance, suggesting that, before proceeding to Triplett, we drive over to Sedley and have a look at Whitefield's Millpond and collect mature material of the puzzling *Eryngium* and its various companions of October, some of which would certainly be novelties. It seemed, however, that Professor Alfred Akerman, the Director of Seward Forest, wished to see forest-conditions and experimental plantings in Greensville and southern Southampton and had most kindly proposed that we unite errands and spend a long day afield with the Forest truck on the 14th, when I could take a night train, at Emporia, north toward Boston. That plan was so superior to mine that there was no question about it; a few days later we could take the cream from the now abnormally broad sand-beaches of Whitefield's, Airfield and Johnson's Millponds and Long would still more regret that he had been unable to join us.

Seward Forest is a wonderful experimental area for scientific study of forestry and, with very restricted income, Dr. Akerman and his loyal and underpaid associates are projecting and carrying on invaluable researches. It was a comfort to me to find that this wise and very practical experimenter in forest problems did not have the love of forest fires, as necessary to the stimulation and growth of valuable timber, which is sometimes urged. In fact, the adult trees of Long-leaf Pine, a species which some students claim to need fire if the seedlings are to succeed, have, without that stimulus, successfully planted seeds, and a number of vigorous columns of young trees are there thriving. Most

happily Dr. Akerman did not have the prejudice against botanical research which so frequently blocks our work and, whenever possible, he joined in the local exploration and everywhere found special trees or local tree-species which became the subjects for stimulating discussion. The University of Virginia and the state have invaluable assets in the Seward Forest and in the great capacity and sound common sense of its Director.

Even on the crest, where Long-leaf Pine is successfully renewing itself as a little isolated colony, the rock is mantled by pebbles with rounded sides; and at lower levels the woods and fields are strewn with smoothed and rounded stones and pebbles. This is not what one finds in the ordinary fracturing and frost-heaving of igneous rock. It is most difficult to escape the idea that in this area the old stones and pebbles have been rounded under or by water. The creeks and branches are small and at the lowest levels. In view of the several typical or elsewhere exclusively Coastal Plain species of plants growing there one, who is not a geologist, inclines to the view that an arm of the Miocene Sea must here have intruded back into the Piedmont and that its waters rounded the granitic pebbles and that typical plants, now chiefly of the inner Coastal Plain, subsequently found there the soil-conditions which suit them. At any rate, *Cynoctonum sessilifolium* thrives on a mossy and partially wooded flat; *Hypericum setosum* has recently been found by Mr. Lewis at a second station; *Panicum aciculare of* "Sandy woods and pinelands, Coastal Plain" (*Small*) and *P. lucidum* of "sphagnum bogs, Coastal Plain" (*Small*) abound. In fact, the mingling of Coastal Plain with ordinary Piedmont and even Appalachian Upland plants is very striking. *Panicum aciculare* and the montane *Danthonia compressa* may be collected side-by-side in dry woods. *Kuhnia eupatorioides*, though found in rich woods on the Coastal Plain, is preeminently a plant of the Interior. Near it may be collected the striking *Sorghastrum Elliottii* (Mohr) Nash, here at a new inland limit.

A mile or two up Rattlesnake Creek, west of Triplett, there is a swampy pond-hole in the woods, locally known as the "bog". Here the slightly retarded creek has spread over a flat and, after heavy rain, may become so flooded as to form a considerable pond. One might be in southern Southampton County. The

pool and its margin support several Coastal Plain types, their known ranges here extended 15 to 30 miles inland: *Paspalum fluitans* (Ell.) Kunth (see RHODORA, xxxix. 382, pl. 474, figs. 6–10), *Cyperus densicaespitosus* Mattf. & Kükenth., *Commelina diffusa* Burm. f. (see RHODORA, xlii. 434) and *Hydrolea quadrivalvis*. In dry woods otherwise typical *Andropogon scoparius* has glabrous, instead of densely villous sheaths, and part way up a wooded bluff the northern and upland *Pyrola rotundifolia* var. *americana* has a sterile colony, a plant one would look for in the mountains.

A little mossy swamp-hole, locally known as "Ram-hole" Swamp, because of the ram installed there for pumping water, is largely given over to retarding brambles, but in the mossy thicket there is an abundance of the always beautiful *Lobelia glandulifera* (Gray) Small (see RHODORA, xxxix. 345 and map 20 on p. 343), a species with three geographic centers, (1) from the inner Piedmont of North Carolina across the mountains into Tennessee, (2) several hundred miles to the south, the Coastal Plain of southwestern Georgia and adjacent Florida, and (3) the Coastal Plain of southeastern Virginia and northeastern North Carolina, inland to Amelia and eastern Brunswick Counties. Here it might have been derived either from the southwest or the east; but the goldenrod growing with it may give a clue. Resembling the northern and upland calcicolous *Solidago patula* in having almost wing-angled square stems, it yet is very different. Its technical characters will be defined in Part II. I was delighted to make its acquaintance but somewhat annoyed for, having closed off three different times the treatment of *Solidago*, with 75 species and many cross-references by number for a revised Gray's Manual, I was obliged to interpolate another and to shift the numbering. Nevertheless it is nice to have in Virginia so definite a species as *S. salicina* Ell. It is a fine species of acid bogs of the Coastal Plain and outer Piedmont, described by Stephen Elliott from western Georgia.

One of the finest pieces of hardwood (beech, oak and hickory) in the Seward Forest is back of the old Chamblis place. Here are splendid trees and here Dr. Akerman is carrying on some very productive experiments in forest-reproduction. The soil is deep and, as in all undisturbed beech-oak-hickory forest, full of

interesting upland plants. *Panicum flexile*, a characteristic inland grass, follows the wood-road; and toward the base of one slope there is a bit of the flora of the Blue Ridge or the Alleghenies: *Polygala Senega* var. *latifolia*, *Ligusticum canadense*, and, most surprising of all, the montane *Zizia trifoliata* (Michx.) Fernald in Rhodora, xlii. 298 and pl. 623 (1940), better known as *Z. Bebbii* (Coult. & Rose) Britt.

In an old fallow field back of the Chamblis house there is a large colony, spread evidently by stolons, of a small Leguminous shrub which, Mr. Lewis assured me, never flowers and fruits. It proves to be *Glycyrrhiza lepidota* Nutt., var. *glutinosa* (Nutt.) S. Watson, a rare Licorice from the extreme western side of the United States. It is a large and rapidly increasing remnant of a colony presumably once cultivated. Having, as a boy, chewed licorice-root, I was happy to taste a forgotten nibble, but students now in the university had never even heard of it. One of them returned every few minutes, asking for "a little bit more". I finally had the root firmly glued to the herbarium-sheet!

Hoping for a natural pond-shore, I pushed the inquiry, but the best they could suggest was Simms Millpond, southwest of Fitzhugh, where the dam had gone out some years ago. Proceeding there, we were amazed to see the greatest area of Poke, *Phytolacca americana* (or *decandra*), probably anywhere in existence. The entire drained pond-bottom was a solid, dense thicket of it much higher than our heads. We broke our way into it, hoping for lingering colonies of something more interesting but to no avail. But economically and gastronomically the Poke is interesting and I was surprised to find that it was not being used. The young shoots, as soon as they sprout in early spring, are greatly appreciated as a wholesome and highly nutritious vegetable and are brought regularly to city-markets in many regions, as Charleston, South Carolina, Washington, Baltimore, Philadelphia, etc., as a market-vegetable. The top of the gigantic taproot has a circle of many buds. As soon as the leading shoots are cut others replace them. The leaves alone, from stems up to 3 feet high, are a valuable and delicious potherb, and nothing more tasty, nutritious and quickly cooked could be found than the new stems 2 or 3 feet high, easily rid of the tough rind. *Phytolacca*, only locally appreciated in parts of our country, was

early carried to southern Europe, where it is cultivated for its new shoots. Simms Millpond is locally looked upon as a dead loss. The self-sown crop of tremendously vigorous Poke growing there could feed all Brunswick County for two months in the spring. Tops of the big roots, boxed in earth, frozen, and then placed in a cellar and watered, would supply a green vegetable all winter, and the new shoots from such a God-given truck-farm, sent to an appreciative market, might bring large financial return. The difficulty is to get conservative people to eat what they do not purchase at the corner-market.

Following weeks of unbroken drouth rain came very soon after I reached Seward Forest. It had come to stay and we came in with rain-coats dripping. In the morning of my last day there Dr. Akerman defied the storm and joined Lewis and me on a trip to the Meherrin River, a few miles to the north, above Western Bridge. I specially wanted to see the place because Lewis had collected in flower on the wooded river-bluff the southern *Tiarella* with stout rhizomes, no stolons and very slender racemes. I wanted to secure fruiting material. Trying to dodge the worst downpours, we started up-river in a forest of almost pure growth of *Acer floridanum*, but I very soon worked down to the bottom-land-thicket, for I was attracted by several species there. *Boltonia caroliniana* (Walt.) Fern. in Rhodora, xlii. 487, pl. 642 (1940) was abundant and very tall, though with pink, instead of white ligules, its range extended inland 15 miles or more, and the small-headed *Helenium* was certainly the same as that of the Coastal Plain farther east. We have accumulated so many collections of this *Helenium* from southeastern Virginia that, in desperation, I have tackled the genus. My conclusions will be found in Part II. Vernal and aestival species of this bottom-land were of course unrecognizable, but one leaning and sprawling, very brittle *Muhlenbergia* at once arrested attention. I had just "done" *Muhlenbergia* for the Manual and had attempted to point out more fundamental characters than those commonly used. This one, associated with the common *M. frondosa* (Poir.) Fern. in Rhodora, xlv. 235, pl. 749 and 750 (1943), was none I had seen from the Atlantic slope. Study of its spikelets and comparison in the herbarium shows it to be another prairie species (southwestern Indiana and Illinois to Texas), *M. glabri-*

flora Scribn., isolated, like *M. brachyphylla* (see p. 365) in southeastern Virginia. The lower Meherrin valley begins to compete for honors with the Nottoway. In fact, I now hesitate to make estimates of the relative interest of the isolated or localized floras of the Meherrin, the Nottoway, the Blackwater, and the smaller and sluggish rivers farther east. Each has its specialties. In the aggregate they are a remarkable and still largely unknown flora.

Below the bridge, the steep bluff gave us battered fruit of *Tiarella*. It is so unlike that of the northern *T. cordifolia*, with which it had been placed, as a variety, that in Part II I shall discuss what seem to me its characters and identity. With it were other interesting species and, of course, spring and early summer would yield many more. As notable as any now recognizable were typical *Amsonia Tabernaemontana*, heretofore known in the state only from two stations on the Coastal Plain, and *Scutellaria serrata*, previously unknown in the southern counties east of the Blue Ridge—again the juxtaposition of montane and Coastal Plain specialties.

In the late afternoon, my packing being done, preliminary to a daylight start next morning, I consented to go with Lewis to a little *Cephalanthus*-pool in the woods, which he has dubbed Triplett Pond. Repeatedly, as we drove past it he had gently asked: "Wouldn't you like to look in there?" As regularly, I had declined the invitation. *Cephalanthus*- and *Decodon*-holes rarely yield much, but in this one he had caught small animals which belonged much farther south. I was glad to clear my conscience and to have a look before leaving Seward Forest. On the way, as we passed through dry pine woods, I was surprised to see most characteristic plants of *Gnaphalium obtusifolium* var. *Helleri* (Britt.) Blake, for this very definite variety (see Rhodora, xxxviii. 231, pl. 434, figs. 8 and 9), although originally described from Northwest in southeastern Norfolk County and abundant about Eastville on the Eastern Shore, had never been known inland. Here was an extension inland of 85 miles. The slight inland extension of var. *micradenium* Weath. was negligible and expected. Reaching the little pond-hole, I was amazed to see the coastal *Gratiola virginiana* var. *aestuariorum* Pennell (see Rhodora, xliv. 440, pl. 730, fig. 3). Surely this was no brackish,

tidal shore. But I was diverted by the big clumps of a coarse pilose *Panicum*, which somehow looked familiar but which I could not immediately place; and no wonder, for it is *P. longifolium* var. *pubescens* (Vasey) Fern. in RHODORA, XXXVI. 69 (1934), described by Vasey from Florida and never known north of that state. Lewis knew what he was about when he wanted me to "look in there"; and again I had had rubbed in what we never learn, that in a country with the complex flora of southeastern Virginia every natural spot, no matter how commonplace in aspect, may harbor strongly isolated and local plants.

It was hard to leave the hospitality and stimulating companionship of Dr. and Mrs. Akerman and Mr. and Mrs. Lewis, but next morning in driving rain Akerman, Lewis and I started in the truck for the sand-beaches of ponds in Southampton and Sussex Counties. The forester made his observations and we had a cheerful and interesting trip but, alas, it had rained without letup for five days. When we got to Sedley we were told that we could not get at Whitefield's Pond from the south, for the road was completely under water and the dam itself flooded. That sounded pretty bad and when we reached Whitefield via Corinth, there was the overflowing pond extending back into the woods. The farmer living near by told us that in the forty years he had lived there the water had never been so low as it was until this five-day rain came on. We could have wept. Locating a spot where the little *Eryngium* should be, I walked in to shoulder-depth (I was already drenched by rain), ducked and grabbed. Nothing but floating *Utricularia* and debris came up. The *Eryngium* still evades us. Stopping in Emporia at the home of Lewis's sister and her husband, Dr. and Mrs. George C. Faville (who were sufficiently venerable to have studied botany under the late Professor Charles E. Bessey (1845–1915) in Iowa, but endowed with unlimited alertness and vivacity) and their daughter, Mrs. Wheeldon, I changed to dry clothes and was ready for the all-night ride to New York.

In April Lewis located flowers and young buds on the new *Asarum* and on the 23rd I reached Seward Forest. Restrictions on the use of gasoline had greatly tightened. Lewis had planned to drive to Emporia (18 miles away) for me but the mails had failed to deliver to him my post-card of a week before, saying

when I would arrive. Taxicabs were allowed to cover territory within 10 miles of Emporia and no farther. That distance, fortunately, got me to the Brunswick County line, where I transferred to the taxi of a local farmer who relayed me to Triplett. My home was with one of the foresters and his family, Mr. and Mrs. Howard Nicholson and two delightful little daughters. The fallow fields were carpeted with the vernal weeds and I introduced the family, and especially the children, to the edible qualities, particularly as nibbles and salads, of young Henbit, *Lamium*, and of Peppergrass, *Lepidium virginicum*.

The *Asarum* was locally abundant at the bases of wooded slopes along creeks and branches, great colonies with heart-shaped to slightly halberd-shaped, scattered, solitary firm leaves, but flowers were excessively scarce. In a patch with thousands of leaves there was often not a single bud nor flower; in another patch a few could be found but their peduncles were very fragile and it was difficult to secure a good specimen, showing the thread-like subterranean rhizomes and stolons, without breaking off the flower. Whiteoak Creek and Rattlesnake Creek, investigated at many places, yielded their specimens, and colonies with several young flower-buds were noted, that Lewis might later secure fruit. We here had a very distinct new species and it seemed evident that its rare flowering was a result of its occurrence along creeks and branches where it is often submerged and where its very efficient vegetative reproduction, by slender, subterranean stolons, suffices for its local spread. On the last day, one of the forest-crew having errands in Emporia, we went with him in the truck, in search of this new and very local plant outside Brunswick County. Since both Whiteoak Creek and Rattlesnake Creek are tributary to Fontaine ("Fountain") Creek, the obvious place to look was farther down the latter valley. At our first stop, at the bridge over Fontaine Creek near Barley in southwestern Greensville County, Lewis promptly walked into it; but that seems to be about its eastern limit, not far from the entrance of Rattlesnake into Fontaine Creek. Other crossings of Fontaine Creek did not yield it, although the stretch from the mouth of Rattlesnake Creek to Round Hill Church could not be examined. At Round Hill Church the banks would be forbidding to it, acid sand with *Kalmia latifolia* forming a dense thicket and,

where the white sand is loose and dry, supporting the most beautiful and extensive colony of *Phlox nivalis* I have ever seen. In RHODORA, xlii. 476 (1940) I took up for this plant the unequivocal name, *P. Hentzii* Nutt. (1834) because in the place where he started the name *P. nivalis* Loddiges had given no adequate diagnosis. Subsequently, however, Dr. Wherry, in RHODORA, xliii. 71 (1941), showed that the name given by Loddiges was validated by Sweet in 1827, when a proper diagnosis and fuller description were published. *P. nivalis,* then, has right of way.

The woods along Fontaine Creek lower down, in an area southwest of Dahlia, seemed so like those along Whiteoak and Rattlesnake Creeks that we hopefully went there. As Lewis agreed, it is just the right habitat but no *Asarum* could be found. Subsequently, by saving up his gasoline, Lewis trailed the new species to a small creek in Brunswick County which empties into Roanoke River. How extensively it occurs along Roanoke drainage can be determined only when more gasoline is available. At any rate, this remarkable new species will be described and illustrated (PLATES 774 and 775) in Part II.

Just below Emporia the Meherrin is bordered by a forest composed largely of a yellow-flowered Buckeye. In 1936 Long, Griscom and I had got a little of it in woods along Metcalf Branch, which enters the Meherrin a mile farther down; and in RHODORA, xxxix. 352 and 435 (1937) and xl. 441 (1938) I erroneously recorded it as *Aesculus discolor* Pursh, a more western species. The freshly flowering material secured from the extensive forest of the tree shows it to be *Ae. neglectus* Lindl., var. *pubescens* Sargent. It was a novel experience to wander in such a forest on the inner edge of the Coastal Plain. Whereas at Triplett, only 18 miles to the west and with creeks at barely 100 feet greater elevation, spring was just emerging, here it was almost summer. *Corydalis flavula,* which we had known on the Coastal Plain of southeastern Virginia only along the James and its tributaries was scattering seed; the fruits of *Nemophila microcalyx* and of *Viola striata* (also James River specialties) were ripe. Great carpets of *Phacelia dubia* had enough lingering flowers to be handsome and, surprise of surprises, here were thousands of plants, now passing out of bloom, of upland and inland *Trillium*

sessile, the first member of its genus I had ever seen growing in southeastern Virginia. There was no time to linger. These and a few other species were tucked into a portfolio and I hurried to catch the night train northward, hoping that some "break" would soon get Long and me to this botanically unexplored and most distinctive area of the Meherrin at the inner margin of the Coastal Plain. At least, I could get another and longer visit there when, a few weeks later, I should return to Seward Forest to follow up *Rubus*, which there seems to be a series somewhat different from that of the Coastal Plain. When I regretfully said good-by to Lewis and with forty people boarded the north-bound train at Emporia, the now familiar announcement of the Conductor reached my ears, "No seats. Standing room only." On the platform of the car, however, there were two square feet of space, where someone had moved. Setting my suitcase on end and placing the portfolio of fresh specimens across it, I had a seat, such as it was, all the way to Washington, where the train decided to make over before proceeding to New York. Three hours wait in a milling throng outside the train-gate from 1 to 4 A. M. was finally relieved by announcement of a train to New York. Such, inevitably, is travel in war-time. There has been no opportunity for another trip, gasoline-rationing having still further tightened; but, in spite of varied and discouraging obstacles, something has been done to keep the flame of botanical exploration burning. The results, more briefly summarized in Part II, are not discreditable. Beginning the Virginia work with three days in the field in 1933, continuing with two to five trips a season for nine years and making but one brief trip, as a guest of the Seward Forest, in April of 1943, we are assembling much substantial data on the flora of the state. In the last report on this work[1] the records of vascular plants new to Virginia, recorded in this series of papers, reached 751. When and if we are again able to renew the exploration the score of novelties to the state can begin the ninth century.

[1] *The Seventh Century of Additions to the Flora of Virginia*, Rhodora, xliv. 341–405, 416–452, 457–478 and plates 717–744—Contrib. Gray Herb. no. CXLV (1942).

Part II. Range-extensions, Technical Notes and Revisions

In Part II, as in previous papers of this series, the notes covering extensions of range are assembled, even though the species has been discussed in the more discursive journal. Several species collected by others and detected in the Gray Herbarium during studies recently prosecuted, or some sent by others, are included if I can find no record of their occurrence in the state. A number of detailed and critical studies are also included since they have grown out of comparisons of our Virginia material or since they deal with genera occurring in the state. The many plates were prepared by Dr. Bernice G. Schubert, to whose skill and patience I am under great obligation. The cost of engraver's blocks has been covered from a grant for personal research from the Department of Biology of Harvard University. As so frequently in the past, Mr. Long has most generously aided in meeting the expense of publication.

As heretofore, plants thought to be previously unlisted from Virginia or only recently recorded in technical studies of groups are indicated by an asterisk (*). In the enumerations the names of the collectors, when Fernald & Long, are generally omitted.

*Potamogeton epihydrus Raf., var. Nuttallii (Cham. & Schlecht.) Fern. × P. pulcher Tuckerm. Isle of Wight County: forming an extensive carpet, outlet of Lee's Millpond, no. 12,230. See Ogden in Rhodora, xlv. 184 (1943). The only known occurrence of this hybrid. See also Rhodora, xliii. 508 and 519 (1941).

*Danthonia spicata (L.) Beauv., var. longipila Scribn. & Merr. See Fernald in Rhodora, xlv. 244 (1943), where several Virginia collections are cited.

D. compressa Aust. See Fernald, l. c. A northern and upland species occurring only locally in the southeastern counties: Surry County: rich calcareous wooded slopes along James River, Claremont Wharf, no. 9825. Brunswick County: oak-hickory-beech woods back of old Chamblis Place, Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,458. See p. 376.

*Muhlenbergia glabriflora Scribn. Brunswick County: exsiccated bottomland woods above Western Bridge, Meherrin River, south of Edgerton, *Fernald & Lewis*, no. 14,460. The first station known from east of the Mississippi Basin (southwestern Indiana and Illinois to eastern Texas). See p. 379.

Digitaria serotina (Walt.) Michx. To the single recorded

Virginia station add another, also in Southampton County: sandy shore of Johnson's Millpond, 1½ miles north of Sedley, no. 14,265. See p. 371.

Paspalum dissectum L. To the few recorded stations add one in Sussex County: sandy shore, Airfield Millpond, southwest of Wakefield, no. 14,264. See p. 372.

P. fluitans (Ell.) Kunth. See Rhodora, xxxix. 282, t. 474, figs. 6–13 (1937). Local range extended into Brunswick County: swampy pond-hole in woods, Rattlesnake Creek, west of Triplett, *Fernald & Lewis*, no. 14,462. See p. 377.

Panicum flexile (Gattinger) Scribn. Brunswick County: clearing in oak-hickory-beech woods back of old Chamblis Place, Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,471. Cited by Hitchcock & Chase only from Alexandria County. See p. 378.

*P. longifolium Torr., var. pubescens (Vasey) Fernald in Rhodora xxxvi. 69 (1934). Brunswick County: sphagnous knolls in woods by Triplett Pond, Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,472. First from north of Florida. See p. 381.

P. aciculare Desv. Local range extended inland to Brunswick County: dry border of oak-hickory-beech woods back of Chamblis Place, Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,466. See p. 376.

P. Wrightianum Scribn. Several additional stations on pond shores. Sussex County: Brittle's Millpond, west of Wakefield, no. 14,267; Airfield Millpond, southwest of Wakefield, no. 14,268. Southampton County: Johnson's Millpond, 1½ miles north of Sedley, no. 14,266; Whitefield's Millpond, southwest of Corinth, no. 14,270. Isle of Wight County: Darden's Pond, southeast of Collosse, no. 14,269. See pp. 371 and 372.

P. auburne Ashe. To the few recorded stations add one in Isle of Wight County: dry sandy pine barrens, south of Zuni, no. 14,275.

P. sphaerocarpon Ell., var. inflatum (Scribn. & Sm.) Hitchcock. In disturbed soil in wet woods along Assamoosick Swamp, northeast of Homeville, Sussex County, the stimulated plants reach a height of 1 m. with leaves up to 1.6 dm. long and 1.5 cm. broad, the panicles 1.5 dm. long and 1 dm. broad. The extreme height given by Hitchcock & Chase for the species is 5.5 dm., with panicles up to 1 dm. long.

*P. tenue Muhl. Westmoreland County: open, sandy pine woods, Colonial Beach, *F. T. Hubbard*, no. 413, as *P. ensifolium*. Not recorded from north of North Carolina.

P. mundum Fernald in Rhodora, xxxviii. 392, t. 443, figs. 1–5 (1936). To the few recorded stations add one in Norfolk County: sphagnous pocket, upper border of fresh reed-marsh and swale along Northwest River near Northwest, no. 14,272.

*Setaria verticillata (L.) Beauv. Rockbridge County: along sidewalk, Lexington, August 23, 1924, *J. R. Churchill.*— Not indicated for Virginia on Hitchcock's map 1567 (*Man.*).

The common northern Burgrass.—The common Burgrass of open sands, from New Hampshire to Oregon, south to North Carolina, Kentucky, Missouri, Kansas and New Mexico, is indigenous or spread from indigenous colonies through much of this range but, singularly enough, it has always passed under specific names which technically belong to other species. Long identified as *Cenchrus echinatus* L., it was forced to resign that name to the quite different tropical species. Similarly the name *C. tribuloides* L. soon proved to belong to the very coarse tropical and southern coastal species. Then *C. carolinianus* Walt. was despairingly grasped, but Walter's type is unknown, our plant is doubtfully in his territory, and Mrs. Chase, Contrib. U. S. Nat. Herb. xxii. 76 (1920), believes that *C. carolinianus* might have been *C. incertus* M. A. Curtis, which does grow in Walter's country. In her monograph of the genus she merges our plant with the Mexican *C. pauciflorus* Benth. and, until Dr. I. M. Johnston, working upon his Mexican and southern Texan material, segregated it off from the great bulk of specimens from the northern and Rocky Mountain region of the United States, it so rested. Dr. Johnston, not wishing to get involved with the more northern and northeastern plant, called the matter to my attention. There is no doubt that *C. pauciflorus* is the Mexican (and Texan) species, Bentham having described it from Lower California: "culmis suberectis, . . . Folia plerumque angustiora [quam in *C. echinata*], spinis dorsalibus marginalibusque validis basi dilatatis".

Cenchrus pauciflorus, then, is the Mexican and Texan species with culms usually in erect or ascending tufts, the leaves 1.5–4 mm. broad, the summit of the sheath spreading as a chartaceous flange; spikes 1–5 cm. long, 1–1.5 cm. thick; the stramineous involucres 8–12 mm. broad (from tip to tip of mature spines), the dorsal and lateral spines compressed and broad-based. The characteristic fruit, from the type of *C. pauciflorus*, is shown by Mrs. Chase, l. c. fig. 17, p. 68.

Our plant, on the other hand, has more generally decumbent or rooting culms, up to 8 dm. long and strongly geniculate;

leaves 3–8 mm. broad, the enlarged sheaths constricted at summit; spike 1.5–8 cm. long and 1.3–2 cm. thick, the mature stramineous to bronze or purplish burs 1–1.5 cm. in diameter, with the coarse spines subulate-subterete. The bur is beautifully shown, as that of *C. pauciflorus*, in Chase, l. c. 69, fig. 18, and this figure, instead of that of true *C. pauciflorus*, was copied in Hitchcock, Man. fig. 1594. As compared with that of real *C. pauciflorus* it is too large, with more numerous spines, the stronger ones more slender and without deltoid and flattened bases.

So far as I can find the only available name for the northern and transcontinental species is *C. echinatus*, forma *longispinus* Hackel, based upon Connecticut material collected by Harger and distributed by Kneucker (no. 426). As a diagnosis of a form of *C. echinatus*, in the loose sense, Hackel's brief description was sufficient. Treated as a species the plant demands a fuller account. It is fortunate that Hackel has supplied the basonym and type. Even so, I take no comfort in having even my name intimately associated with a *Cenchrus* and the keen taxonomist who called it to my attention would not care to have the species named for him!

Cenchrus **longispinus** (Hackel), stat. nov. *C. echinatus*, forma *longispinus* Hackel in Kneucker, Allg. Bot. Zeitschr. ix. 169 (1903). Planta annua; culmis decumbentibus vel adscendentibus ad 8 dm. longis geniculatis basi ramosis; foliis 3–8 mm. latis, vaginis distentis apice constrictis; spicis maturis 1.5–8 cm. longis 1.3–2 cm. crassis; involucris maturis stramineis vel aeneis vel purpurascentibus hirsutis 1–1.5 cm. diametro, spinulis majoribus tereti-subulatis. Type of *C. echinatus*, forma *longispinus*: Oxford, Connecticut, *E. B. Harger* in Kneucker, Gram. Exsicc. Lief. XV. no. 426.

In southeastern Virginia, fortunately, *Cenchrus longispinus* is rare. Our only collections are the following. James City County: sandy field about 5 miles west of Toano, *R. W. Menzel*, no. 187. Southampton County: dry white sand of clearing in oak and pine woods bordering Assamoosick Swamp, south of Sebrell, no. 10,941; grassy roadside about 7 miles south of Franklin, no. 7297 (misidentified as *C. incertus*).

Erianthus coarctatus Fernald in Rhodora, xlv. 246, t. 758 (1943). Note that the plant of Sussex County previously reported as *E. brevibarbis* Michx. belongs here. *E. brevibarbis* is a very different plant of the Mississippi Basin.

*EULALIA VIMINEA (Trin.) Ktze., var. VARIABILIS Ktze. *Pollinia imberbis* Nees, var. *genuina* Hackel, Andropogoneae in DC. Mon. vi. 178 (1889). GREENSVILLE COUNTY: roadside bordering rich woods by Three Creek, northwest of Emporia, nos. 12,564 and 13,883.

When, in RHODORA, xliii. 518 and 536, I reported *Eulalia viminea* (no. 12,564) from Greensville County we had not yet got the flowers. The later collection (no. 13,883), made October 13, 1941, shows the plant to be var. *variabilis*, which is characterized by having delicate awns up to 9 mm. long. Blake's plant, collected along the James River at City Point, near Hopewell in October, 1931 (*Blake*, no. 11,472) is of typical *E. viminea* (i. e. *Pollinia imberbis*, var. *Willdenowiana* (Nees) Hackel), with awnless spikelets. Typical *E. viminea* occurs southward to Alabama: shaded bank of Tennessee River, northeast of Sheffield, Colbert Co., Oct. 7, 1934, *Harper*, no. 3275.

The earliest valid generic name for the genus is *Eulalia* Kunth, Rév. Gram. i. 160, t. 93 (1829), although Hackel, like most Old World botanists, has maintained *Pollinia* Trin. in Mém. Acad. Pétersb. ser. VI. ii. 304 (1833). In so doing they may have been misled by Index Kewensis, which lists just before *Pollinia* Trin. another *Pollinia* Spreng. Pugill. ii. 10 (1815), "farrago [mixture] = seq. &c." The "&c" is correct, for Sprengel had 10 species, none of them considered by Hackel as belonging in *Pollinia* Trin.: 6 referred by Hackel directly to *Andropogon;* 1 to *Oplismenus;* 1 to *Ischaemum;* and 2 wholly doubtful "species inextricabiles" (Hackel, l. c. 565). *Pollinia* Trin. (1833), clearly antedated by *Eulalia* Kunth (1829), must lapse.

In looking up the origin of the generic name *Eulalia* the quickest method was to turn to the shelf of dictionaries and to see what Wittstein said in his Etymologisch-botanisches Handwörterbuch. There it is: "**Eulālia** KNTH. (*Gramineae*). Zus. aus εύ (schön, gut) und λαλια (Rede, Gericht, Ruf); ein schönes, guldgelbblühendes Gras". The type of the genus being *E. aurea* Kunth, that derivation is plausible. Had Wittstein taken the trouble to look up Kunth's own explanation, however, he would have found a more pleasing and splendidly appropriate explanation of the name, for it is difficult to imagine more beautiful illustrations (all signed E. D.) than the 220 wonderful plates

by Eulalia Delile which clarify Kunth's remarkable volumes. That Kunth was fully appreciative of his artist is made clear by his own explanation: "Dixi hoc genus in honorem Eulaliae Delile, cujus perito elegantique penicillo icones hujus operis ut et quorumdam aliorum debet botanice".

*Andropogon scoparius Michx., var. genuinus Fern. & Grisc. in Rhodora, xxxvii. 143, 144 (1935), forma **calvescens,** f. nov., vaginis glabris. Virginia: dry woods along Rattlesnake Creek, west of Triplett, Brunswick County, October 11, 1942, *Fernald & Lewis*, no. 14,474 (type in Herb. Gray.; isotype in Herb. Phil. Acad.); moist sandy and peaty pine barrens, south of Lee's Mill, Isle of Wight County, August 23 and September 2, 1940, *Fernald & Long*, no. 12,567. See p. 377.—Quite like typical *Andropogon scoparius* (= var. *villosissimus* Kearney) but with the sheaths glabrous instead of densely villous.

Sorghastrum Elliottii (Mohr) Nash. Local range extended inland to Brunswick County: dry woods along Rattlesnake Creek, west of Triplett, *Fernald & Lewis*, no. 14,473. See p. 376.

Bulbostylis ciliatifolius (Ell.) Fern. New northeastern extensions. Isle of Wight County: dry sandy pine barrens south of Zuni, no. 14,283. Southampton County: dry sand of open alluvial flat by Blackwater River, southeast of Unity, no. 14,284. See p. 369.

*Scirpus subterminalis Torr. Princess Anne County: shallow water, northwest branch of Salt Pond, June 28, 1922, *L. F. & Fannie R. Randolph.*

Although Britton, Ill. Fl., cites *Scirpus subterminalis* as extending south to South Carolina and Small, Man. 169, says "Miss.", I have been unable to locate previous material from south of New Jersey and Pennsylvania. There is nothing in the Gray Herbarium nor in the Britton Herbarium from south of New Jersey and Pennsylvania, except the Salt Pond specimen; and the rather extensive collecting in eastern South Carolina and eastern North Carolina by Godfrey did not bring it to light. Beetle, however, in Am. Journ. Bot. xxx. 396 (1943) seems to have seen material from both South Carolina and Mississippi.

The Specific Characters of Scirpus Olneyi—One of the most distinctive species of *Scirpus*, § *Schoenoplectus*, is the coarse, soft-stemmed *S. Olneyi* Gray (1845), which follows saline and brackish marshes from eastern South America up the Atlantic to southern New Hampshire and Nova Scotia, the Pacific to Washington. In many characters the plant is so

distinctive that amateurs who do not distinguish between some technical species usually recognize this one at a glance. It is, therefore, a bit startling to find in the Am. Journ. Bot. xxx. 397 (1943) Beetle merging it with and reducing it to *S. chilensis* Nees & Meyen (1843). Beetle's detailed description of the inclusive species, as *S. chilensis*, clearly says "style 2-fid", which is correct for the tropical and North American *S. Olneyi*, and in his discussion he speaks of the original diagnosis of *S. chilensis* as "adequate to identify the plant". He then quotes the diagnosis of *S. chilensis*, including the original and easily corroborated "stylo trifido"; but he gives no explanation of how a plant of the warmer half of the Northern Hemisphere with "style 2-fid" is necessarily, or even probably, identical with a plant of temperate South America with "stylo trifido". This distinction is constant, apparently. So are several others. The broadly wing-angled soft culm of *S. Olneyi* is so very soft that in pressing it becomes flat and ribbonlike; in fresh condition, however, it has deep reëntrant angles which caused Asa Gray, in originally describing it, to give the following vivid description: "distinguished by its remarkably 3-winged stem. The reëntering angles are so deep that the cross section presents the appearance of three rays, or plates with parallel sides, joined by a common center." The collapsing of the culm under very slight pressure results from its hollow or fistulous character, the pith occurring as scattered remnants only. If *S. Olneyi* is identical with *S. chilensis* it is notable that the much more slender culms of the latter are firm and resistant, not flattened in drying, that they lack the extremely broad wing-angles and deep reëntrant concavities and that they are closely filled with pith.

In *S. Olneyi* the upper leaf-sheaths have a U- or V-shaped orifice and the brown tissue of the sheath-summit is readily friable; in *S. chilensis* the orifice is subtruncate or very shallowly concave and the tissue firmer. In *S. chilensis* the excurrent midribs of the scales project more prominently than in *S. Olneyi*. In *S. chilensis*, as already noted, there are 3 style-branches, in *S. Olneyi* 2. Although the achenes of the bipartite *S. chilensis* sensu Beetle are given absolute dimensions, "2.5 mm. long, 1.5 mm. broad", the few achenes of *S. chilensis* available, from *Pennell*, no. 12,923 and *Osten*, no. 22,029, are definitely more

slender than in *S. Olneyi*. These two numbers of *S. chilensis* have achenes narrowly obovate and three fifths to three fourths as broad as long: 2.6 × 1.8 mm., 2.4 × 1.8 mm., 2.3 × 1.5 mm. On the other hand, ripe fruit from material of *S. Olneyi* from the general type-region, southern New Hampshire to Virginia, shows much more rounded or broadly obovate achenes four fifths as broad to essentially as broad as long: 2.2 × 1.8 mm., 2.2 × 2 mm.; 2.4 × 2.2 mm., 2 × 1.8 mm., 2 × 1.6 mm., etc. Whether or not typical *S. Olneyi* occurs in temperate South America I am not situated to determine. Barros & Osten described a *S. Olneyi*, forma *australis* from Uruguay in Anal. Mus. Hist. Nat. Montevid. ser. 2, iii. 204 (1931) and in vol. xxxviii. 159 and 161 (1935) Barros illustrated it and cited much material from Argentina but did not suggest that it includes *S. chilensis*. In fact, in the latter detailed study Barros definitely cited (p. 156) *S. chilensis* as identical with *S. americanus* Pers. I am content to keep up *Scirpus Olneyi* as a thoroughly distinct species.

In Virginia *Scirpus Olneyi* makes extensive colonies often 2 m. or more high, on the saline and brackish shores.

*S. VALIDUS Vahl, var. CREBER Fern., forma MEGASTACHYUS Fernald in RHODORA, xlv. 283, t. 765, fig. 8 (1943). JAMES CITY COUNTY: marsh of Chickahominy River about 5 miles west of Toano, *R. W. Menzel*, no. 89.

*S. ETUBERCULATUS (Steud.) Ktze. PRINCESS ANNE COUNTY: shallow water, northwest branch of Salt Pond, June 29, 1922, *L. F. & Fannie R. Randolph*, no. 462.

Scirpus etuberculatus, one of the most localized of species, has a long-known station near Salisbury, Maryland, one or two in southeastern North Carolina, two in Georgia, one in Florida, two in Alabama, one in Mississippi, and one in Louisiana. The station of Mr. and Mrs. Randolph is apparently the first between southeastern North Carolina and Salisbury, Maryland.

*S. ROBUSTUS Pursh, forma **protrusus,** f. nov., spiculis plus minusve elongatis ad 3–5 cm. longis.—VIRGINIA: brackish to fresh marsh along Back Bay, at eastern margin of Long Island, Princess Anne County, August 25, 1939, *Fernald & Long*, no. 10,973 (TYPE in Herb. Gray., isotype in Herb. Phil. Acad.); border of salt marsh, Ragged Island, northeast of Carrollton, Isle of Wight County, August 20, 1940, *Fernald & Long*, no. 12,587.—Differing from typical *S. robustus* (with spikelets 1.3–3 cm. long) by its very prolonged spikelets.

S. MARITIMUS L., var. FERNALDI (Britton) Beetle. See Fern. in RHODORA, xlv. 289 (1943). *S. novae-angliae* Britton. Our only collections are from the James River or its tributary creeks. SURRY COUNTY: tidal marsh at mouth of Crouch Creek, east of Scotland, no. 8593, previously reported as *S. novae-angliae*. JAMES CITY COUNTY: tidal shore of Back River, opposite Jamestown Island, no. 10,972, distrib. as *S. robustus* Pursh.

*S. MARITIMUS, var. FERNALDI, forma AGONUS Fern. l. c. 288 (1943). NEW KENT COUNTY: fresh tidal marsh by Lacey Creek, west of Walker, no. 13,559.

*RHYNCHOSPORA FILIFOLIA Gray. SUSSEX COUNTY: upper border of siliceous and argillaceous shore, Airfield Millpond, southwest of Wakefield, no. 14,301. First station between southeastern North Carolina and Cape May, New Jersey. See p. 372.

CAREX DECOMPOSITA Muhl. To the three recorded stations add one in SOUTHAMPTON COUNTY: margin of cypress swamp bordering Womble's (or Wade's) Millpond, north of Baffle, no. 14,305. See p. 373.

C. BAYARDI Fern. *C. virginiana* Fern., not Woods. Range extended northwestward in SOUTHAMPTON COUNTY: sandy alluvial bottomlands of Three Creek, Adams Grove, no. 14,306. See p. 367.

C. VENUSTA Dewey. To the few recorded stations add one in DINWIDDIE COUNTY: wet springy sphagnous woods east of Cherry Hill, no. 14,307. See p. 367.

C. COLLINSII Nutt. To the few recorded stations add one in DINWIDDIE COUNTY: wet springy sphagnous woods east of Cherry Hill, no. 14,311. See p. 366.

COMMELINA DIFFUSA Burm. f. Local range extended inland to BRUNSWICK COUNTY: swampy pond-hole in woods, Rattlesnake Creek, west of Triplett, *Fernald & Lewis*, no. 14, 478. See p. 377.

AMIANTHIUM MUSCAETOXICUM (Walt.) Gray. Local range extended northward in ISLE OF WIGHT COUNTY: clearing in damp sandy pine barrens south of Zuni, no. 14,315. See p. 369.

NOTHOSCORDUM BIVALVE (L.) Britt. Range extended inland from Princess Anne and Northampton Counties: JAMES CITY COUNTY: turf back of beach and disturbed soil in woods and thickets back of sand-beach of James River, Martin's Beach, southeast of Grove, *Fernald, Long & Abbe*, nos. 14,128 and 14,129. ISLE OF WIGHT COUNTY: turf back of sand-beach of Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), *Fernald, Long & Abbe*, no. 14,127. See pp. 360, 364.

*LILIUM CANADENSE L., var. **editorum,**[1] var. nov. (TAB. 771, FIG. 3–5), a var. typico recedit foliis mediis ellipticis vel oblongis acutis vel subacutis, vix attenuatis, latitudine ⅕–½ partem

[1] ***Editorum*** **(of the uplands) from** ***editum*****, upland or a height; not from** ***editor!***

longitudinis aequante; floribus rufescentibus; perianthii tubo elongato, tepalis supra medium sensim arcuatis; petalis (siccis) 0.8–1.3 cm. latis.—Locally from the mountains and the Allegheny Plateau of Pennsylvania to Kentucky and the mountains of Alabama. PENNSYLVANIA: Waddle, Center County, July 3, 1939, *J. P. Kelly;* thickets along Conoquenessing Creek, Butler County, July 17, 1932, *John Bright*, no. 6789. OHIO: Columbus, 1837, *Lesquereux?* WEST VIRGINIA: swale near Cacapon River, Hampshire County, July 1, 1933, *Hunnewell*, no. 12,771. VIRGINIA: open mountain-meadow at about 4000 feet alt., top of Butt Mountain and at about 3500 feet alt. near Little Stony Creek near "Cascade Road", Giles County, July 24, 1943, *A. B. Massey*, no. 4617 (TYPE in Herb. Gray.); meadow, Virginia Hot Springs, Bath County, July 5, 1917, *Hunnewell*, no. 4824; woods at 2700 feet alt., Shenandoah Mt., Rockingham County, July 14, 1932, *Hunnewell*, no. 12,481. KENTUCKY: swampy meadows, 2 miles south of London, Laurel County, July 4, 1939, *McFarland*, no. 3545; oak-chestnut mountain-summit forest, at 4000 feet alt., Black Mt., Harlan County, July 22, 1937, *E. Lucy Braun*, distrib. as *L. canadense* or *L. michiganense.* ALABAMA: rich woods on limestone, north slope of Monte Saho, Madison County, June 22, 1932, *T. S. Van Aller.*

Freshly collected material of *Lilium canadense* var. *editorum* reached me just as this Contribution was starting to the printer, Professor Massey sending it with a query as to its real identity. Typical northern *Lilium canadense*, described from Canada and occurring from the Gaspé Peninsula of Quebec to northeastern Ohio, south to Nova Scotia, New England, Pennsylvania and upland to western Virginia, has the lanceolate (narrowly to broadly) leaves of the median whorls attenuate to acute tips, the blades $\frac{1}{10}$–$\frac{1}{5}$ as broad as long, the usually yellow flower (red only in the rare forma *rubrum* Britt.) with relatively short and thick tube, the tepals strongly arching (FIG. 1) from below or near the middle, the petals 1.2–2 cm. broad. Occasional specimens have the leaves of var. *editorum* but the flower of typical *L. canadense.* Such a transitional series is represented by *MacDaniels & Thomas*, no. 3710 from Ithaca, New York. It is noteworthy, then, that Ithaca is near the northern border of the Allegheny Plateau as mapped by Fenneman.

The chief points of departure of var. *editorum* are its relatively broad and only slightly if at all tapering leaves, its red flower with slender and elongate tube, so that the arching of the tepals

starts near or above the middle, and the narrow tepals, the petals in dried specimens being only 0.8–1.3 cm. broad. One collection before me, *C. E. Wood, Jr.*, no. 1365, from sedge-meadow, Little Meadows, northwest of Mountain Lake, Giles County, Virginia, has the leaves narrower than and as attenuate as in the most extreme northern plant, with flowers nearly of var. *editorum*.

A number of the above cited specimens were sent to the Gray Herbarium with indications of doubt as to the identity and usually with note of the red flower. The *Bright* material from Butler County was marked in the hand of a temporary assistant "*Lilium michiganense*", while the *McFarland* specimen was identified with doubt as *L. canadense*, and the old sheet from Columbus, Ohio, originally identified as *L. canadense*, bears modern annotations, first as *L. superbum* L., later as *L. michiganense* Farw. Until Professor Massey sent his material the question of an undescribed montane variety had not been considered. The accumulated discontent with the identification of the plant lead to its more critical study.

When we know ripe fruit of *Lilium canadense*, var. *editorum* the seeds may show some further differences. The ripe fruit of typical northern *L. canadense* is well represented in the collections before me, by 19 numbers in fully mature fruit, collected in eastern Canada and interior New England, north or inland from the coastwise northern limit of *L. superbum* and far east of the quite different inland *L. michiganense* Farw. The fully developed seeds of *L. canadense* vary from 7–11 mm. long, mostly 9–10 mm. It is hoped that mature fruit of the montane plant may soon be available.

The frequent misidentification of *Lilium canadense*, var. *editorum* as the eastern and southern *L. superbum* or as the midland *L. michiganense* reflects dissatisfaction with its being called simply the northeastern *L. canadense* but it also indicates lack of understanding of the morphological characters which separate *L. michiganense* and *L. superbum* from one another and both of them from *L. canadense*.

In PLATE 771, FIG. 1 is typical LILIUM CANADENSE from Lexington, Massachusetts, painting by the late *Elsie Louise Shaw;* FIG. 2, characteristic leaves from Shelburne, New Hampshire, July 30, 1924, *Walter Deane*. FIGS. 3–5, var. EDITORUM: FIGS. 3 and 4, flower and median leaves from TYPE; FIG. 5, flower from Butler County, Pennsylvania, *John Bright*, no. 6789. All figs. × 1.

Trillium sessile L. Greensville County: rich woods along Meherrin River, below Emporia, *Fernald & Lewis*, no. 14,530, very abundant. Our first record from the Coastal Plain. See p. 383.

The Dwarf Trillium of Southeastern Virginia (Plates 772 and 773).—In southeastern Virginia the genus *Trillium* is so very local and scarce that in ten seasons of field-work I had never met any member of the genus there growing wild until Mr. Lewis and I came upon the extensive colony of *T. sessile* above noted. I had, however, reported in Rhodora, xlii. 445 (1940) the occurrence in the Great Dismal Swamp of a plant which I then misidentified as *T. lanceolatum* Boykin; Professor Smart had told me of the occurrence near the University of Richmond of a scarce plant thought to be *T. pusillum* Michx., this discovered in May, 1931; and in the Gray Herbarium there is, under *T. pusillum*, a sheet of exactly similar material from near Powhatan Creek in James City County, discovered by *Mrs. W. G. Guy* and *Dr. Stetson*, also in early May, 1931, and sent to the Gray Herbarium by Professor Warren. Furthermore, Mr. Lewis told me of a station in Dinwiddie County which had been shown to Mrs. Laura H. Lippitt by the friend who had discovered it. From this station, rich loamy woods near a stream in company of Royal Fern, Sensitive Fern and Lady-fern and *Medeola* (a very frequent association), Mrs. Lippitt has sent me a beautiful series of freshly flowering specimens, with the note that the petals are white, turning pink and then dark purple.

Altogether, the dwarf *Trillium* has a considerable, though highly localized, occurrence in the southeastern counties of Virginia; and, in identifying the Meherrin River *T. sessile*, it became quite apparent that the tiny plant is all of one distinctive species and that it is neither *T. lanceolatum* nor typical *T. pusillum*. The latter, *T. pusillum* Michx. (plate 772), was described as having the leaves sessile, the flower peduncled and erect, the sepals scarcely longer than the petals, the petals pale flesh-color; and it came from pinelands of South Carolina. The Michaux material (our fig. 1) well agrees with this description and the label gives the further information: "35 m. de Charlest. environ Gaillard road". Just such a plant, figs. 2 and 3, is known from eastern South Carolina. It has the flower long-peduncled, the

petals about equaling or even longer than the sepals, 1.8–2.5 cm. long and 4–9 mm. broad; the anthers sometimes 5–6 mm. long, definitely longer than the filaments, or in otherwise typical South Carolina plants only 3 mm. long and definitely shorter than the filaments. The plant of southeastern Virginia (PLATE 773, FIGS. 1 and 2) looks like *T. pusillum*, but its flowers are sessile or elevated on a peduncle up to only 5 mm. long. If the latter embarrassing individuals are excluded, it is one of the "sessile-flowered" species; if they are taken into account it is a species with peduncled ("pediceled") flowers, a bit awkward in key-making. Its petals are mostly shorter than the sepals, 1.2–2 cm. long and 3–5 mm. wide, the anthers 3–8 mm. long and only slightly if at all longer than the filaments.

In view of the inconstancy in length of anthers and the overlaps in other characters I am treating the plant of Virginia as a geographic variety of *Trillium pusillum*, rather than as a distinct species. The sessile flowers of most Virginia material were responsible for one collection being placed with *T. lanceolatum*. That more southern species, however, has the sepals soon reflexed and the long and tapering petals (our PLATE 773, FIG. 3) with slender claw-like bases. The Virginia plant is

TRILLIUM PUSILLUM Michx., var. **virginianum,** var. nov. (TAB. 773, FIG. 1 et 2), a var. typicum recedit flore sessile vel subsessile; petalis 1.2–2 cm. longis 3–5 mm. latis, antheris 3–8 mm. longis.—Southeastern VIRGINIA: Henrico County: damp woods north of Westwood Golf Course, May 8, 1931, *R. F. Smart & Elmer C. Pritchard* (Herb. Univ. of Richmond); woodland north of University Road, Westwood, May 8, 1931, *Mary E. Billings*. JAMES CITY COUNTY: Long Hill Swamp, Powhatan Creek on Centreville Road west of Williamsburg, discovered by *Mrs. W. G. Guy and Dr. Stetson*, coll. May 3, 1931, by *Paul A. Warren*. NORFOLK COUNTY: Great Dismal Swamp, west of Wallaceton, April 24, 1926, *Paul A. Warren*, no. 413. DINWIDDIE COUNTY: rich loamy woods near stream, 5 miles east of Dinwiddie Court House, May 9, 1943, *Laura H. Lippitt* (TYPE in Herb. Gray.).

In view of the evident dimorphism as to length of anthers in both typical *Trillium pusillum* and its var. *virginianum*, it is evident that too much weight has been placed upon the length of anthers in the group. See p. 364.

PLATE 772 is of TRILLIUM PUSILLUM Michx., × 1: FIG. 1, Michaux's TYPE, original photograph by *Cintract;* FIG. 2, plant from Pinopolis, South Carolina,

April, 1897, *Maria P. Ravenel;* FIG. 3, plant from Pinopolis, May, 1895, *E. Peyre Porcher.*

IN PLATE 773, FIGS. 1 and 2 are from the TYPE-collection, × 1, of T. PUSILLUM, var. VIRGINIANUM, n. var.; FIG. 3, summit of T. LANCEOLATUM Boykin, × 1, from Aspalaga, Florida, April 11, 1902, *Biltmore Herb.*, no. 6085.

*NARCISSUS BIFLORUS Curtis. ISLE OF WIGHT COUNTY: rich calcareous wooded slopes by Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), *Fernald, Long & Abbe*, no. 14,130 Originally spread from cultivation.

CALOPOGON PALLIDUS Chapm. Range extended northward in ISLE OF WIGHT COUNTY: clearing in damp sandy pine barrens south of Zuni, no. 14,320. See p. 369.

*ULMUS PROCERA Salisb. CAROLINE COUNTY: steep wooded bluff by Rappahannock River, northwest of Return, *Fernald, Long & Abbe*, no. 14,136. See p. 358.

*ASARUM (§ HETEROTROPA) **Lewisii,** sp. nov. (TAB. 774 et 775), glabrescens; caule gracili subterraneo pallido valde elongato (ad 4 dm. longo), furcato ramibus stoloniferis; foliis longe-petiolatis solitariis coriaceis plus minusve maculatis deltoideis vel deltoideo-ovatis vel subreniformibus obtusis, sinu basalari rotundato, laminis maturis 2–8 cm. longis 2.5–8.5 cm. latis; flore pedunculato subnutante, calyce campanulato extus glabro griseo-brunneo, intus atropurpureo villoso, 2–3 cm. longo 1.3–2 cm. diametro, lobis vix patentibus.—Southeastern Brunswick County and southwestern Greensville County, VIRGINIA: bottomland-woods along Rattlesnake Creek, west of Triplett, Brunswick County, October 11, 1942, *Fernald & Lewis*, no. 14,480; sandy loam in woods along Whiteoak Creek, near Triplett, April 23, 1943, *Fernald & Lewis*, no. 14,531; mixed woods along Rattlesnake Creek, below Wright's Bridge, April 24, 1943, *Fernald & Lewis*, no. 14,532 (TYPE in Herb. Gray.); mixed woods along Rattlesnake Creek north of Ankum, Brunswick County, May 24, 1943, *Lewis*, no. 3825; bottomland-woods along Fontaine Creek west of Barley, Greensville County, May 17, 1943, *Lewis;* along Pea Hill Creek about a mile north of Gasburg, Brunswick County, May 29, 1943, *Lewis*, no. 3826. See pp. 374, 381–383.

In some ways combining the characters of our two eastern American sections of the genus. It has the deltoid to ovate or reniform, evergreen and often mottled leaves much as in *A. arifolium* Michx. or in *A. Ruthii* Ashe; while the extensively creeping and stoloniferous stems fork as freely as in *A. canadense* L., but they are subterranean, not superficial, much more slender, and bearing the scattered leaves singly along the axes and at the tips of the widely creeping stolons. Mr. Lewis had found only sterile plants, always in colonies on bottomlands or just above

the bottomland-levels of small creeks of southeastern Brunswick County, Virginia, which empty into Fontaine Creek and, eventually, into Meherrin River. In October, 1942, I had the great pleasure of visiting the Seward Forest, as the guest of the Director, Professor Alfred Akerman and Mr. Lewis, and when they showed me the strange *Asarum* it was, as Mr. Lewis had written, characteristic of the thin bottomland-woods just above creek-margins and where, during high water, it is regularly overflowed. It is colonial, making extensive colonies, with the rather small deltoid to ovate long-petioled leaves scattered (one-at-a-time), never in tufts.

In late April of 1943 I again was a guest at the Seward Forest, for Mr. Lewis had written that he had discovered a few flower-buds on different colonies, the very young buds showing some weeks after *A. canadense* and *A. virginicum* had begun blooming. On April 23, Dr. Akerman, Mr. Lewis and I found a few fully expanded flowers and several very young buds, usually only one fertile plant amongst hundreds of sterile ones, along Whiteoak Creek, near Triplett, and next day about the same meagre proportion of buds and fully grown flowers at the bases of gentle slopes to Rattlesnake Creek, these chiefly among fallen beech-leaves. And on April 26, when I had to be driven to Emporia to take the train back to Boston, we conceived the idea, since both Whiteoak and Rattlesnake Creeks empty into Fontaine Creek, one of the choice habitats of Greensville County to the east, of trailing the new species down that valley into the Coastal Plain. The first crossing to the eastward in Greensville County reassured us, for along Fontaine Creek, not far from its receipt of Rattlesnake Creek, near Barley, Mr. Lewis promptly detected a colony. That was the last we saw. Later, however, Lewis trailed it to Pea Hill Creek, which empties into the Roanoke River, his station being 10 miles farther west than those near Triplett. We are, then, forced to consider the new species as a highly localized one of southern Brunswick County and southwestern Greensville County.

Although as extensively creeping as *Asarum canadense*, its resemblance stops there. In foliage *A. Lewisii* is, as stated, related to *A. arifolium* and to *A. Ruthii* of *Asarum*, § *Heteroptropa* (the genus *Hexastylis* Raf., Small and their followers),

while its large drab-brown to drab-purple, campanulate calyx is nearly as large as in *A. Shuttleworthii* J. Britten (southwestern Virginia, Tennessee and Alabama), but with the outline of that of *A. virginicum*. In all these characteristic species of *Asarum*, § *Heterotropa*, the rhizome is stout and short, covered heavily with thick and very elongate roots and at summit forking into ascending crowns bearing tufted leaves. The new *Asarum Lewisii*, with which it is a great pleasure to associate the name of its discoverer, the perennially enthusiastic naturalist of the Seward Forest, John Barzillai Lewis, is unique in the section in its prolonged, slender, horizontal, subterranean, cord-like whitish rhizomes with few slender roots, the axes and the stolons bearing only scattered leaves. With this very effective vegetative reproduction and inhabiting bottoms where the plants are frequently submerged, *A. Lewisii* seems to flower (and then very sparingly) only when the colonies, as in late April and May of 1943, remain unsubmerged during the normal flowering period.

No fruit seems to form and the fragile peduncle readily breaks, even when the flowers are only partly grown.

Paronychia riparia Chapm. Limit of range extended northeastward in Southampton County: dry sand of open alluvial flat by Blackwater River, southeast of Unity, no. 14,324. See p. 370.

P. canadensis (L.) Wood. Local range extended eastward into Isle of Wight County: rich wooded slope above bottomland woods along Blackwater River, above Broadwater Bridge, north of Zuni, no. 14,325.

Holosteum umbellatum L. Apparently spreading; new or sandy roadside-fills in Essex and Hanover Counties. Perhaps introduced in foreign seed used on new soft shoulders. See p. 359.

Stellaria media (L.) Cyrill., var. glaberrima G. Beck. See Rhodora, xlii. 451 (1904). Add a station in Isle of Wight County: turfy waste ground back of sand-beach of Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), *Fernald, Long & Abbe*, no. 14,142. See p. 360.

Cerastium brachypetalum Desportes. Local range extended north to Stafford County: roadside-fill about 4 miles southeast of Falmouth, *Fernald, Long & Abbe*, no. 14,144. See p. 358.

*Nymphaea odorata Ait., forma rubra Guillon. Sussex County: in water at margin of Chappell's Millpond (Honey Pond), west of Lumberton, no. 14,327, growing with the common white-flowered form.

Cabomba caroliniana Gray. Nansemond County: ditch

along highway, northern border of Great Dismal Swamp, east of Magnolia, no. 14,328. Our first station in the Tidewater counties. See p. 368.

Ranunculus abortivus L., var. indivisus Fernald. Stafford County: disturbed soil at border of rich woods about 3 miles southeast of Falmouth, *Fernald, Long & Abbe*, no. 14,148. First except along Nottoway River. See p. 358.

R. Sardous Crantz. Local range extended into Sussex County: siliceous and argillaceous fallow field, Jarratt, *Fernald, Long & Abbe*, no. 14,151. In view of the dominance of this species in fields and pastures about Franklin, likely to spread rapidly.

Morphological Differentiation of Clematis ochroleuca and Allies (plates 776–782)—The simple-leaved and erect species of *Clematis*, of which *C. ochroleuca* Ait. Hort. Kew. ii. 260 (1789) was the first American one described, has had many treatments. So far as I can find there is no clear demonstration of the identity of the plant described by Aiton. It was cultivated in England and very briefly described, the name given on account of the color of the sepals. It is and has been assumed to be the most eastern of species, found chiefly in the Piedmont and inner Coastal Plain region from southeastern New York to southeastern North Carolina and the mountains of northern Georgia. Until Aiton's material is checked, with the real morphological distinctions in the group clearly in mind, the established interpretation should not be disturbed. It is evident, certainly, that the Plukenet plant from Banister cited by Aiton "flore unico ochroleuca" is the plant generally known as *C. ochroleuca*. Plukenet's figure is characteristic.

My object in this note is to define on more stable and fundamental lines than are relied upon in the two latest treatments, the eastern species of *Clematis*, § *Viorna*, sub-§ *Integrifoliae*. The latest treatment, that of Erickson in Ann. Mo. Bot. Gard. xxx. 13 and 35–39 (1943), keys our species in a manner quite reminiscent of the key of Wherry in Journ. Wash. Acad. Sci. xxi. 195 (1931). Wherry's key was as follows:

"Plant sparingly branched and small leaves relatively few; head of fruit tending to be spherical, about 6 cm. in diameter; achenes nearly symmetrical.
Under side of leaves glabrate to moderately pubescent; hairs of achene-appendages deep, or exceptionally pale, yellow; range chiefly at altitudes below 1000 feet, mostly in Piedmont..... **C. ochroleuca ovata**

Under side of leaves moderately to densely pubescent; hairs of achene-appendages pale, or exceptionally deep, yellow; range chiefly at altitudes above 1000 feet, mostly in Blue Ridge.....**C. ochroleuca sericea**

Plant copiously branched and small leaves relatively numerous; leaves glabrate.

Head of fruit nearly spherical, about 5 cm. in diameter; achenes fairly symmetrical, their appendage-hairs brown.....**C. viticaulis**

Head of fruit spheroidal, about 4 cm. high and 6 cm. broad; achenes rather unsymmetrical, their appendage-hairs whitish.....**C. albicoma**"

As above stated, the latest monographer of the section gives in his key no more fundamental distinctions than these and leans primarily on the evasive and contradictory degree of branching (note the contradiction in his "EE" and its subordinate "FF", below) and the still more evasive degree of coloring (note "EE" with "achene-tails usually lighter in color" as contrasted with "E" in which the color is "reddish-brown", the first species under the "lighter . . color" being *C. ochroleuca* in which the tails (styles) may be "tawny". Here is Erickson's statement of the "specific" differences:

"E. Plant profusely branched; leaves lanceolate, less than 6 cm. long; sepals glabrous; achene-tails reddish-brown.....13. *C. viticaulis.*

EE. Plant less branched; leaves ovate, at least some of them more than 6 cm. long; sepals pubescent; achene-tails usually lighter in color.

F. Plants simple or few-branched, more or less pubescent; achene-tails light yellowish-brown to tawny.....11. *C. ochroleuca.*

FF. Plants usually much branched, often white silky-pubescent throughout; achene-tails whitish or pale yellow.....12. *C. albicoma.*"

Not having the field-familiarity of Dr. Wherry with *C. albicoma* and *C. viticaulis*, I have been forced to my interpretation of these two treatments thus handicapped. By following the above keys I arrive at very perplexing results, for the characters depended upon are such as vary with extreme plasticity; and, whereas Erickson says in his key that the leaves of *C. viticaulis* are "lanceolate" as opposed to "ovate" in *C. ochroleuca* and *C. albicoma*, his fuller account of *C. viticaulis* says "leaves lanceolate to narrowly ovate", the other two species being assigned leaves which may also be "narrowly ovate".

As to the degree of branching so much relied upon in the two treatments, I, again, have been handicapped by not having

before me all the material their authors studied, except that in the Gray Herbarium, which was borrowed by Erickson. I have, however, had the great advantage of studying a large series of specimens from the Blue Ridge in Roanoke County, Virginia, most kindly sent me for study by Mr. Carrol E. Wood, Jr. Taking into consideration only the plants which are complete down to the lowest node (omitting obviously broken-off branches) I get the following results.

NUMBER OF BRANCHES FROM MAIN AXIS

C. OCHROLEUCA, "plant sparingly branched" or "simple or few-branched" (47 plants): branches 0=13 specimens; 1=1; 2=5; 3=4; 4=7; 5=6; 6=7; 7=3; 9=1. Average 3.2 branches.

C. VITICAULIS, "plant copiously" or "profusely branched" (7 plants): branches 0=1; 2=1; 4=2; 5=1; 6=1; 8=1. Average 3.4 branches.

C. ALBICOMA, typical glabrescent plant, "copiously" or "usually much branched" (19 specimens): branches 0=4; 3=1; 4=2; 5=5; 6=3; 7=1; 8=3. Average 4.5 branches.

C. ALBICOMA, tomentose var., "plant copiously" or "usually much branched" (36 plants): branches 0=4; 1=4; 2=5; 3=8; 4=6; 5=4; 6=3; 7=1: 8=1. Average 3.2 branches.

With more than half of the compiete plants of the "simple or few-branched" *C. ochroleuca* (PLATE 776, FIG. 1) having 4–9 elongate axillary branches, while the "profusely" or "usually much branched" species show nearly half the plants with less than 4 branches, I am quite incapable of applying the character as a clear diagnostic one or even a worth-while tendency.

As to leaf-outline and size one also has to be pretty cautious. The sheet of *Adams & Wherry*, no. 2413, from the type-locality of *Clematis viticaulis*, defined in Erickson's key as having "leaves lanceolate, less than 6 cm. long", shows blades 6.5 cm. long by 3 cm. broad. As already noted, such leaves are narrowly ovate, rather then "lanceolate". Other topotypic specimens of *C. viticaulis* show primary leaves with the following dimensions: *Killip*, no. 32,484 (PLATE 778, FIG. 1), blades 7 cm. long; *Adams & Wherry*, no. 2418, blades 7.8 cm. long by 4 cm. broad; *Wherry*, June 11, 1930, blades 7 cm. long by 4.6 cm. broad, much more than "narrowly ovate". As a key-character "leaves lanceolate, less than 6 cm. long" is not wholly satisfactory, especially since, likewise, so many specimens of *C. albicoma* in the most restricted sense have leaves scarcely different in shape and size, topotypes (from Kate's Mountain) showing the largest leaves 6.2 cm. long

(*Gilbert*, no. 511), 6–6.5 cm. (*Marion S. Franklin*, September 4, 1920, our PLATE 779, FIG. 1), 6.2 cm. (*Small*, May 16, 1892), 7 cm. (*Hermann & Martin* in Pl. Exsicc. Gray., no. 951), 7 cm. (*Core*, no. 2708), 5.8 cm. (*Addison Brown*, July 22, 1892), while plants from near Deerfield, Augusta County, Virginia (*Wherry*, no. 2420), have the larger leaves only 4.5 cm. long. Here, again, those who hope for clarification find "a distinction without a difference".

In his key Erickson assigns *Clematis viticaulis* "sepals glabrous" as opposed to the pubescent sepals in the other plants. I hope they are glabrous; Steele, in describing the species, did not know them, and Wherry cited besides Steele's collection only his own from the type-locality, collected June 11, 1930. As shown by the two flowers of Wherry's plant in the Gray Herbarium, the sepals (PLATE 778, FIG. 2) are closely pilose. In fact, in his detailed description (p. 38) the "sepals glabrous" of Erickson's key were allowed to be "slightly pubescent without". Those of Wherry's topotype, however, are certainly less pubescent than in *C. albicoma* (PLATE 779, FIG. 4) or in *C. ochroleuca* (PLATE 776, FIG. 3).

As to the fruiting head, in Wherry's treatment that of *C. ochroleuca* is "tending to be spherical, about 6 cm. in diameter," that of *C. viticaulis* "nearly spherical, about 5 cm. in diameter" and that of *C. albicoma* "spheroidal, about 4 cm. high and 6 cm. broad". The abundant series of *C. ochroleuca* before me shows that the mature fruiting heads (PLATE 776, FIG. 4) range from 5–10 (average 7) cm. in diameter, with the long plumose styles loosely separated at the margin of the head, while in *C. albicoma* the mature head (PLATE 779, FIG. 1 and 780, FIG. 6) is compact, with tightly recurving plumose styles, the heads 4–7 cm. thick. The fruiting head of *C. viticaulis* (PLATE 778, FIGS. 1 and 3) is as small as in *C. albicoma* but with fewer and loosely spreading plumes (much as in *C. ochroleuca*). I am not sufficiently a mathematician fully to appreciate the differences between "tending to be spherical", "nearly spherical" and "spheroidal". According to the Century Dictionary a spheroid is "A geometrical body approaching to a sphere, but not perfectly spherical". Since in *C. ochroleuca* the fruiting head is "tending to be spherical" and in *C. viticaulis* only "nearly spherical" while in *C.*

albicoma it is "spheroidal" (i. e. "approaching to a sphere, but not perfectly spherical") this character is too erudite for me.

Similarly, the exact shades of difference between "nearly symmetrical", "fairly symmetrical" and "rather unsymmetrical" are difficult to visualize. Furthermore, the distinctions between "deep, or exceptionally pale, yellow", "pale, or exceptionally deep, yellow" are not wholly satisfactory. In characteristic *Clematis ochroleuca*, the easternmost plant, the mature plumes range from a deep, almost cinnamon-brown to whitish-yellow or pale buff, the range in color being comparable to that in the mature perianths of *Eriophorum virginicum;* and, although the plumes of *C. albicoma* are commonly whitish-gray or drab (on white paper they do not look "whitish"), the series of its more pubescent and relatively eastern variety sent me for study by Mr. Wood shows some numbers with plumes as brown as in average *C. ochroleuca.* Exactly the same range of color occurs in other species of § *Viorna.* In *C. Viorna* L. Erickson rightly allows the "achene-tails . . . light yellow or brownish". In some recently collected (therefore not faded) material before me (*Godfrey*, no. 5004 from Wake County, North Carolina) they are as pale as in extreme *C. albicoma*, while in other material (*Godfrey & Tryon*, no. 806 from Orangeburg County, South Carolina) they are as dark as in the most extreme *C. ochroleuca* or as in *C. viticaulis.* Color of hair, like the other characters used in recent keys, is not sufficiently stable to demonstrate that *C. ochroleuca*, *C. viticaulis* and *C. albicoma* are clear-cut species.

There are, however, some characters of deeper significance, which seem to show that *Clematis albicoma* and *C. viticaulis* are really separable. In fact, Erickson recorded the most significant characters in his descriptions of the three but these points, which are the strongest ones, were omitted from his key in favor of superficial and wholly inconstant ones. I refer to the great elongation of the fruiting peduncles in *C. ochroleuca* (PLATES 776 and 777), as opposed to the relatively short peduncles of the others, and to the very different direction of the pubescence on carpels and achenes. These characters are constant in all the material I have seen, without regard to degree of pubescence of stem and leaf, size of leaf, amount of branching and paleness or deepness of color of the coma. To me they are the soundest

differential characters, though not so easy to see without careful examination.

The white-silky or -tomentose plant (PLATE 780) concentrated on the Blue Ridge, of which Mr. Wood sends me a splendid series for study (largely as a loan) is evidently what Wherry had primarily in mind when he published the combination *C. ochroleuca*, var. *sericea* (Michx.) Wherry. Since it is not *C. sericea* Michx. (PLATE 777) and since its more stable characters are those of *C. albicoma*, to which Wherry often referred specimens and with which essentially glabrous and mostly more western plant (PLATE 779) Erickson merges this white-pubescent one of the Blue Ridge, I am redefining the latter. As I understand the three species and the variety, I treat them as follows:

a. Carpels and achenes with appressed pubescence, that at the summit pointing forward; lowest villi of the fruiting style ascending or spreading-ascending; fruiting head with styles loosely separated at margin.

Stems either simple or loosely branched, the branches only exceptionally overtopping the main axis; larger leaves of primary stem 6–12 cm. long, silky-pilose to glabrate beneath; flowers 2–3.5 cm. long, the cinereous backs of the sepals densely silky-villous; mature fruiting peduncle lengthening to 5–19 (av. 11+) cm., much overtopping the subtending leaves; mature fruiting head 5–10 (av. 7) cm. in diameter, the plumose styles 3–6 cm. long..... *C. ochroleuca.*

Stems with axillary branches often overtopping the main axis; larger leaves of primary axis 5–7.8 cm. long, glabrescent beneath; flowers about 2 cm. long, the greenish backs of the sepals only minutely pilose; mature fruiting peduncles 1–5 cm. long, shorter than subtending leaves; mature fruiting head 4–5.5 cm. in diameter, the brownish plumose styles 2–3 cm. long.... *C. viticaulis.*

a. Carpels and achenes with horizontally divergent to reflexed long hairs on the upper half; lowest villi of the fruiting style similarly divergent; fruiting head with styles strongly arcuate-recurved, 3–5 cm. long, the head consequently compact; fruiting peduncles 3–9 cm. long; flowers 1.7–2.8 cm. long; central axis often or usually overtopped by axillary branches.

Main axis 2–3 dm. high, the stems loosely pilose but becoming glabrescent; leaves at first sparingly pilose on veins beneath, otherwise glabrous, soon quite glabrate, the larger ones 4–7.5 cm. long and 1.5–4.5 cm. broad..... *C. albicoma.*

Main axis 2–4.5 dm. high, the stems densely and persistently pilose-tomentose; leaves persistently pilose-tomentose beneath, the larger ones 6–10 cm. long and 4–9 cm. broad..... *C. albicoma*, var. *coactilis.*

Since the descriptions, ranges and citation of specimens of

C. ochroleuca (our PLATE 776) and *C. viticaulis* (PLATE 778, FIGS. 1–4) have been so well given by Erickson, it is here necessary only to define the restricted *C. albicoma* and its var. *coactilis*.

*CLEMATIS ALBICOMA Wherry, var. **coactilis,** var. nov. (TAB. 780), planta habitu *C. albicomae* typicae simillima plerumque ramosa ramis lateralibus axem centralem superantibus; caule centrali 2–4.5 dm. alto densissime persistenterque villoso-tomentoso; foliis dilatatis axis primarii 2–3-jugis ovatis majoribus deinde 7.5–10 cm. longis 5.5–9 cm. latis coriaceis subtus persistenter piloso-tomentosis; foliis ramorum elongatorum 2–4-jugis majoribus 6–10 cm. longis 4–6 cm. latis; pedunculis crassis dense villoso-tomentosis deinde 4–9 (av. 6.6) cm. longis; sepalis anguste ovatis 2.8 cm. longis 1.3 cm. latis dorso densissime villoso-tomentosis; capitulo fructifero denso 4–6 (av. 4.8) cm. diametro; achaeniis oblique subrhomboideo-obovatis plus minusve strigosis dorso apiceque divergenter villosis; stylo maturo valde arcuato-recurvato 3–5 cm. longo, albido- vel sordido-plumoso, villis inferioribus horizontaliter divergentibus superioribus plus minusve adscendentibus.—Mountains of western VIRGINIA: Roanoke County: shaly southwest-facing slope of Green Ridge, about 2.25 miles northeast of Hanging Rock, April, 1940, *Carroll E. Wood, Jr.*, no. 127 (flowering); dry ledges along Mason Creek, about 1.25 miles north of Hanging Rock, June 24, 1942, *Wood*, no. 2787a; shaly soil, open oak woods about 1.8 miles north-by-east of Hanging Rock, June 30, 1942, *Wood*, no. 3427; shaly slope about 2 miles north-northeast of Hanging Rock, June 30, 1942, *Wood*, nos. 3432 and 3433 (TYPE in Herb. Gray.); shaly slope about 2.25 miles northeast of Hanging Rock, June 30, 1942, *Wood*, nos. 3445 and 3446; exposed shale barrens (alt. 2800 ft.), Fort Lewis Mountain, about 2.9 miles north-northwest of Dixie Caverns, July 13, 1942, *Wood*, nos. 3920 and 3936. Montgomery County: shale barren 1 mile northeast of Ironto, June 12, 1939, *Wherry* (distrib. as *C. albicoma* Wherry or *C. ochroleuca*, var. *sericea* (Michx.) Wherry). Craig County: shale barren along Craig Creek, 0.5 mile southeast of Newcastle, August 13, 1937, *Fogg*, no. 13,255; barren along Broad Run, 3.5 miles south of Newcastle, June 12, 1939, *Wherry* (distrib. as *C. albicoma*).

The very full series assembled by Mr. Wood and identified by Dr. Wherry as *Clematis ochroleuca* Ait., var. *sericea* (Michx.) Wherry in Journ. Wash. Acad. xxi. 197 (1931) demonstrates to me very effectively the distinctness of *C. albicoma*, var. *coactilis* from *C. ochroleuca* Ait. and from typical *C. albicoma* Wherry (PLATE 779). *C. ochroleuca* (PLATES 776 and 777), occurring from southeastern New York to Georgia, is a relatively taller

plant (2–6 dm. tall), either simple or loosely branched, the branches only exceptionally overtopping the main axis, the internodes more elongate; the young foliage silky-pilose beneath, the silkiness (PLATE 776, FIG. 2) either persistent or disappearing; the young stems pilose, the mature ones sparsely so to glabrate; the fruiting peduncles slender and elongate, 5–19 (av. 11+) cm. long and sparsely pilose to glabrate (PLATE 777, FIG. 2); the fruiting head (PLATE 776, FIG. 4) 5–10 (av. 7) cm. in diameter, with the long plumose styles loosely separated at the margin of the head, either yellowish-brown or drab; the achene (FIG. 5) strigose-sericeous to summit, the gradually arching style 4–6.5 cm. long, with basal villi (FIG. 5) loosely ascending or spreading-ascending.

C. albicoma (PLATE 779) was not formally described by its author, who said that it was "*C. ovata* of current manuals, not Pursh", leaving the reader to figure out the characters except as stated in his key: *C. ochroleuca* (var. *ovata* (Pursh) Wherry) and *C. ochroleuca*, var. *sericea* (Michx.) Wherry defined: "Plant sparingly branched and small leaves relatively few; head of fruit tending to be spherical, about 6 cm. in diameter; achenes nearly symmetrical". Opposed to this is the call embracing *C. viticaulis* Steele and the new *C. albicoma:* "Plant copiously branched and small leaves relatively numerous; leaves glabrate", under which *C. albicoma* is defined "Head of fruit spheroidal, about 4 cm. high and 6 cm. broad; achenes rather unsymmetrical, their appendage-hairs whitish". Since typical *C. ochroleuca* may have 3 or 4 pairs of elongate branches (Staten Island material from *T. F. Allen*—PLATE 776, FIG. 1—or from *E. G.* or *N. L. Britton*, Brooklyn specimens of *John Carey*, Washington material of *L. F. Ward*, and various specimens from eastern Virginia and North Carolina), the first differentiation, as already emphasized, is not clear; and as also noted, furthermore, the difference between heads "tending to be spherical" and heads "spheroidal" is not vivid. We are left with the achene of *C. ochroleuca* "nearly symmetrical", that of *C. albicoma* "rather unsymmetrical". *C. albicoma* is typified as the plant of Kate's Mountain, Greenbrier County, West Virginia. Taking that as a starting point and the descriptions of "*C. ovata* of current manuals" the concept is somewhat clarified. It (PLATE 779) is a usually low-

branching plant with the main axis 2–3 dm. high, the lateral branches soon strongly overtopping it; stem loosely pilose (FIG. 2), becoming glabrescent; leaves at first sparingly pilose on veins beneath, otherwise glabrous, soon quite glabrate (FIG. 3); well-developed leaves of primary axis 1–3 pairs, the larger ones 5.5–7.5 (av. 6.25) cm. long and 2.5–4.4 (av. 3.6) cm. broad; elongate ascending branches with 3 or 4 pairs of well developed leaves, the larger blades 4–7 (av. 6) cm. long and 1.5–4 (av. 3) cm. broad; fruiting peduncles sparsely short-pilose or glabrate, in fruit 3–8 cm. long; sepals (FIG. 4) lanceolate, 1.7–2.7 cm. long and 4–8 mm. broad; fruiting head (FIG. 1) depressed-globose, 4–7 cm. broad; achenes (FIG. 5) divergently long-villous on back and at summit; the fruiting style about 4 cm. long, horizontally villous at base, the whitish-gray villi more ascending toward the apex.

C. albicoma, typified by the plant of Kate's Mountain, and the newly proposed var. *coactilis* (PLATE 780) are nearer to each other than either of them is to the more eastern *C. ochroleuca* (PLATES 776 and 777). I agree with Dr. Wherry that *C. ovata* Pursh, based upon a Catesby specimen from Virginia in the Sherard Herbarium at Oxford, is *C. ochroleuca*. A tracing of it made by me in 1903 shows the characteristics of the latter and it may be noted on PLATE 776 that in 1881 Asa Gray reached the same conclusion. Judging from his very brief characterization *C. ochroleuca*, var. *sericea* sensu Wherry, l. c. 195 and 197 (1931), partly included *C. albicoma*, var. *coactilis*. He did not note the rather striking difference in the pubescence of the carpels and fruits of *C. ochroleuca* and of *C. viticaulis*, as contrasted with those of *C. albicoma*, here discussed and illustrated, nor the marked difference in length of peduncle, size of fruiting head and compactness or looseness of the latter.

Clematis albicoma, var. *coactilis* is not *C. sericea* Michx. Fl. Bor.-Am. i. 319 (1803); and the combination *C. ochroleuca sericea* (Michx.) Wherry, l. c. 197, resting upon Michaux's name, nomenclaturally is the same as *C. sericea*. The TYPE of *C. sericea* (at least the material preserved in Michaux's herbarium) consists of two branches (PLATE 777) in young fruit. They both have the relatively sparse pubescence (FIGS. 2 and 3) and the very elongate and slender peduncles (11 cm. long) of *C. ochro-*

leuca, also the characteristic appressed-ascending villosity (FIG. 4) of the fruiting style-base. In interpreting Michaux's original account it must be borne in mind that he thought that his *C. sericea* was perhaps Aiton's *C. ochroleuca*, that he was comparing it with the Eurasian *C. integrifolia* L. (PLATE 778, FIGS. 5–8) which has nearly glabrous or only minutely hirtellous stem (FIG. 5), glabrous or promptly glabrate leaves (FIG. 6), elongate-lanceolate sepals up to 5 cm. long (FIG. 7) and nearly or quite glabrous on the back, and loose fruiting head (FIG. 8) much like that of *C. ochroleuca*. With *C. integrifolia* before him Michaux described his American material as

> SERICEA. C. caule erecto, pubentissimo: foliis simplicibus, ovalibus; junioribus calycibusque extus incano-sericeis: pedunculo terminali, solitario; flore cernuo.
> *C. ochroleuca*? Ait.
> *OBS.* Affinis *C. integrifoliae;* flore conspicue minore; calyce angustiore. Folia sessilia, opposita, pubescentia.
> *HAB.* in Virginia et in montanis Carolinae.

As contrasted with that of *Clematis integrifolia* the stem of *C. ochroleuca* is "pubentissimo", and the lower surfaces of the young leaves (PLATE 776, FIG. 2) and the outside of the calyx (FIG. 3) are sericeous. The calyx of *C. ochroleuca* is much shorter than in *C. integrifolia*, though the sepals are of about the same shape. In the montane *C. albicoma*, var. *coactilis* (PLATE 780, FIG. 5) the sepals are much broader. The Michaux diagnosis and comparative note give a good characterization of the common *C. ochroleuca* of the Piedmont and inner Coastal Plain region from southeastern New York southward, a species Michaux would have had great difficulty in avoiding.

In 1875 Sereno Watson received from his relative, Dr. Louis Watson of Ellis, Kansas, a variable series of the most western representative of § *Viorna*, sub-§ *Integrifoliae* from Ellis. Some of the specimens, with heavily coriaceous subrotund to ovate or oblong, obtuse leaves, Watson associated with a poor old specimen without stated locality collected on Fremont's 2nd Expedition; and from this series of 12 plants he described *Clematis Fremontii* Watson in Proc. Am. Acad. x. 339 (1875). The series shows simple or branching plants, varying from 1.4 to 4.5 and more dm. (judging from broken-off specimens up to 5.5 dm.) high. Some have heavy oblong leaves at most 5 cm. long

and 2 cm. broad (PLATE 781, FIG. 3), others narrowly ovate ones (FIG. 2), while the broadest-leaved specimens show rounded-ovate and very heavy blades 1.4 × 1.15 dm. (FIG. 1). These form a consistent but highly variable series and are typical *C. Fremontii*. They all have coriaceous foliage strongly overlapping, short internodes and stout fruiting peduncles 0.5–4 cm. long.

One of the Ellis specimens (PLATE 782, FIG. 1), however, not marked by Watson as his *C. Fremontii*, as were all the others, but later so labeled by Asa Gray, differs in its elongate internodes, relatively thin and elliptic-oblong to lance-ovate leaves and slender peduncle, in anthesis more than 5 cm. long. This specimen is intermediate between the most divergent material of var. *Riehlii* Erickson, l. c. 40 (1943), a plant set off on just these characters and said by its author to have "complete geographical isolation". PLATE 782, FIG. 1 shows the summit of the narrow-leaved plant from Ellis, Kansas (the specimen identified by Erickson as TYPICAL *C. Fremontii*). FIG. 2 is a tip from Allenton[1], Missouri (coll. June 10, 1887, by G. W. Letterman) of var. Riehlii. FIG. 3 is a leaf and fruiting peduncle from another Letterman Collection, called by Erickson var. *Riehlii* because from eastern Missouri. In view of the figures given by Erickson of leaf-outlines from "Mass collections" of *C. Fremontii* made in Ellis County, it is a pity that he did not get hold of the plant shown in our PLATE 782, FIG. 1 or such plants as shown in PLATE 781, FIGS. 2 and 3, also from Ellis. They would have materially changed the outlines. Var. *Riehlii* is, it should be evident, not always "completely isolated" from typical *C. Fremontii*. Dr. Louis Watson got it along with the other variations in Ellis County, Kansas. Whether it is more than an ecological variant of more sheltered or less arid habitats is doubtful. Otherwise it would not in Franklin County, Missouri, have such rounded-ovate leaves as that shown in PLATE 782, FIG. 3 (identified and cited as var. *Riehlii*) and in Ellis County, Kansas, sometimes so closely imitate the eastern plant with elongate leaves.

[1] To those who know, what any good atlas will reveal, that St. Louis, Allenton and Eureka are all in St. Louis County, Missouri, it will come as a shock to read in the citations accompanying the original description of var. *Riehlii*: "COUNTY NOT DETERMINED OR DOUBTFUL: . . . St. Louis . . . ; Allenton . . . ; Eureka." In a succeeding article, but not in the one where the statement was published, Erickson, l. c. 64, it is revealed that the doubt was as to whether the cited specimens actually were collected in St. Louis, Allenton and Eureka, not as to the county in which these towns are located!

Plate 776 is of Clematis ochroleuca Ait.: fig. 1, characteristic branching plant, × 2/5, from Staten Island, New York, May 23, 1884, *T. F. Allen*, with memorandum made by Asa Gray of its identity with *C. ovata* Pursh; fig. 2, lower surface of leaf, × 10, from Staten Island, 1879, *N. L. Britton;* fig. 3, flower, × 1, from New Dorp, Staten Island, May, 1887, *Torr. Bot. Club;* fig. 4, fruiting head, × 1, from Four Mile Run, Virginia, *Pollard*, no. 334; fig. 5, achene and base of tail, × 5, from east of McKenney, Virginia, *Fernald & Long*, no. 14,329.

Plate 777, type of C. sericea Michx. = C. ochroleuca Ait.: fig. 1, two plants, × ½; fig. 2, stem of plant at left, × 2½; fig. 3, peduncle, × 2½; fig. 4, tails of fruit, × 2½, from plant at right.

Plate 778, figs. 1–4, C. viticaulis Steele: fig. 1, topotype, × ½, from *Killip*, no. 32,484; fig. 2, back and margin of sepal, × 10, from topotype, *Wherry*, June 11, 1930; fig. 3, fruiting head, × 1, from last specimen; fig. 4, achene and base of tail, × 5, from topotype, *Adams & Wherry*, no. 2418. Figs. 5–8, C. integrifolia L.: fig. 5, stem, × 10, from Alkabek River, Altai, southern Siberia, *F. N. Meyer*, no. 766; fig. 6, lower surface of leaf, × 10, from no. 766; fig. 7, flower, × 1, from Hungary, *F. Schultz, Herb. Norm.* no. 2501; fig. 8, fruiting head, × 1, from no. 2501.

Plate 779, C. albicoma Wherry: fig. 1, portion of topotype, × 1, from *Marion S. Franklin*, September 4, 1920; fig. 2, stem, × 10, from topotype, *F. A. Gilbert*, no. 511; fig. 3, lower surface of leaf, × 10, from no. 511; fig. 4, flower, × 1, from topotype, *Heller*, no. 842; fig. 5, achene and base of tail, × 5, from no. 511.

Plate 780, C. albicoma, var. coactilis Fernald, all (unless noted) from type: fig. 1, plant, × 3/7; fig. 2, peduncle, × 10; fig. 3, lower surface of leaf, × 10; fig. 4, summit of sepal, × 10; fig. 5, flower, × 1, from *C. E. Wood, Jr.*, no. 127; fig. 6, fruiting head, × 1, from *Wood*, no. 3427; fig. 7, achene and base of tail, × 10.

Plate 781, C. Fremontii S. Wats., all from original series from Ellis, Kansas: figs. 1–3, leaves, × 1, from different individuals; fig. 4, achene and base of tail, × 5.

Plate 782, C. Fremontii S. Wats.: fig. 1, leaf and flower, × 1, from Ellis, Kansas, *Dr. Louis Watson*, 1875, labeled by Erickson as typical *C. Fremontii;* fig. 2, leaf and denuded flower, × 1, of var. *Riehlii* Erickson, from Allenton, Missouri, June 10, 1887, *Letterman;* fig. 3, leaf and fruit, × 1, labeled by Erickson as var. *Riehlii*, from Franklin County, Missouri, June, 1882, *Letterman.*

Asimina parviflora (Michx.) Dunal. Northern limit of range extended well into Isle of Wight County: sandy wooded slope by Blackwater River, west of Blackwater School, no. 14,331. See p. 370.

Corydalis flavula (Raf.) DC. To the few recorded Coastal Plain stations add the following. Stafford County: rich woods along brook about 3 miles southeast of Falmouth, *Fernald, Long & Abbe*, no. 14,157. Greensville County: rich woods along Meherrin River, below Emporia, *Fernald & Lewis*, no. 14,536. See p. 358.

Fumaria officinalis L. To the few recorded stations add one in Essex County: weed in old field near Ware's Wharf, northeast of Dunnsville, *Fernald, Long & Abbe*, no. 14,156.

Drosera rotundifolia L. Local range extended to the west of the Blackwater River (former inland limit on Coastal Plain) in Southampton County: mossy thicket by Cephalanthus-pool

near Johnson's Millpond, north of Sedley, nos. 14,332 and 14,333. See p. 371.

D. CAPILLARIS Poir. To the several known stations add an exceptionally fine one in SUSSEX COUNTY: upper border of sandy beach of Airfield Millpond, southwest of Wakefield, no. 14,334. See p. 372.

(To be continued)

VIRGINIAN BOTANIZING UNDER RESTRICTIONS

M. L. Fernald

(*Continued from page 413*)

Tiarella Wherryi Lakela in Am. Journ. Bot. xxiv. 344, pl. 1 (1937), including *T. cordifolia*, var. *collina* Wherry, Not. Nat. Acad. Sci. Phil. no. 42: 3 (1940) and *T. cordifolia*, subsp. *collina* (Wherry) Wherry, l. c. 4 (1940). To the counties already recorded (Amelia, Mecklenburg, Henry and James City) add the following. Bedford County: May 7, 1871, *A. H. Curtiss.*

Brunswick County: bluffs of Meherrin River, near Westward Mill, May 4, 1942, *J. B. Lewis*, no. 3410; rich wooded bluffs below Western Bridge, Meherrin River, south of Edgerton, October 12, 1942, *Fernald & Lewis*, no. 14,482. See pp. 379, 380.

I get no satisfaction in trying to separate from *Tiarella Wherryi*, described from Tennessee, southwestern North Carolina and Alabama, the non-stoloniferous plant found from the Blue Ridge eastward to the Coastal Plain. According to Wherry, l. c., "*T. Wherryi* differs in flowering later, in the stems usually bearing one or more leaves, and in the acutish sepals rarely being over 2 mm. long and 0.75 mm. wide", whereas his *T. cordifolia*, var. *collina* (type from Henry County, Virginia) has the "leaves similar to those of var. *austrina* . . . in tending to be longer than wide, and in having the marginal teeth broad with shallow sinus; flowers appearing in spring; flowering stems normally leafless; sepals oblong, obtuse, 2.5–3.5 by 1.5 mm."

Stoloniferous northern *Tiarella cordifolia* has the leaves so variable in outline that it is quite easy to find specimens from Maine, New Hampshire and other northern states and from Quebec, New Brunswick and Ontario with leaves inseparable in outline and toothing from those of southern plants cited as var. *austrina* Lakela or as var. *collina*. As defined by Wherry vars. *austrina* and *collina* have the leaves "tending to be longer than wide", while *T. cordifolia* var. *typica* has, according to him, the leaves "tending to be about as long as wide". As already stated, in New England, where var. *typica* alone is supposed to grow, leaves positively longer than wide are common: 5.3 cm. long, 3.6 cm. wide; 6 cm. long, 4.5 cm. wide; 6.5 cm. long, 5 cm. wide; 8 cm. long, 6 cm. wide; 9 cm. long, 7 cm. wide; 9.5 cm. long, 7 cm. wide; 10 cm. long, 9 cm. wide; 10.3 cm. long, 8.3 cm. wide; 11 cm. long, 7.3 cm. wide; 14 cm. long, 11 cm. wide. When, furthermore, we find that many specimens of the nonstoloniferous var. *collina* "foliis var. *austrina* similis" have leaves nearly or quite as broad as long (Amelia Co.: 8 cm. long by 7.4 cm. wide and 11 cm. long by 9.6 cm. wide; Brunswick Co: 7 cm. long by 6.5 cm. wide, 6.5 cm. long by 7 cm. wide, 7.3 cm. long by 7.5 cm. wide, 10 cm. long by 9.5 cm. wide; Durham County, North Carolina: 9 cm. long by 7.8 cm. wide or 9.5 cm. long by 8.5 cm. wide), it is evident that the difference in proportion is of less significance

than assumed. As for size, the maximum given in the original description of *T. Wherryi* is 14 cm. long and 9 cm. wide; but plenty of New England specimens of *T. cordifolia*, var. *typica* have leaves 10–14 cm. long and 9–11 cm. broad, while in the nonstoloniferous Piedmont *T. cordifolia*, var. *collina* full-grown leaves are essentially the same size; and surely the leaf of *T. Wherryi* was originally described as longer than wide, "folia laminis elongato-ovatis . . . 7–14 cm. longis 6–9 cm. latis" and the type-sheet, as shown by the memorandum on Dr. Lakela's photograph (her plate 1) of it, was originally taken by her to be merely a southern variety of *T. cordifolia*.

As to the bract or bracts on the scape, I am unfortunate in not having before me the large series of Dr. Wherry's material of *T. Wherryi*, which is said to differ from his *T. cordifolia*, var. *collina* in "having the stems usually bearing one or more leaves". If, as appears from the original account of *T. Wherryi*, that species is the nonstoloniferous plant of Tennessee and Alabama, it would seem that the considerable series of such plants from those states which has accumulated in the Gray Herbarium and at the New York Botanical Garden should be *T. Wherryi*. The difficulty is, that in this series, including plants from Tuscaloosa County and other areas cited in the original description "caules floriferi . . . nudi vel 1–3 foliis parvis instructi", only 6 scapes show bracteal leaves (in each case solitary), while 47 scapes are bractless. From the station in Brunswick County, Virginia, of what should be naked-scaped *T. cordifolia*, var. *collina*, one of Mr. Lewis's specimens has a well developed leaf on the scape, while a similar specimen from near Raleigh, North Carolina (*Godfrey*, no. 3424) shows bracted scapes. Incidentally, it is notable that Dr. Lakela's illustration of the type of *T. Wherryi* shows only *naked* scapes.

Coming to the reputed difference between the sepals of *Tiarella cordifolia* (var. *collina*) and *T. Wherryi:* the former with "sepals obtuse, 2.5 to 3.5 by 1 to 1.5 mm.", the latter with "the acutish sepals rarely being over 2 mm. long and 0.75 mm. wide", it seems from the material assembled in the Gray Herbarium that too much stress has been given these points. Material from Tuscaloosa County, Alabama, has blunt sepals 3 mm. long and 1.3 mm. broad, while *T. Wherryi* from Grundy County and from Marion

County, Tennessee, *Svenson*, nos. 7653 and 10,056 respectively, shows the sepals quite obtuse. Desiring a check on my own measurements, I asked, without telling him my results, the very accurate Dr. Robert C. Foster to measure under his binocular some selected specimens. His (and my) measurements give the following results, the specimens all being in late anthesis. *T. Wherryi* from Cumberland County, Tennessee, *C. A. and Una F. Weatherby*, no. 6249, sepals 2.3–2.6 mm. long; from Marion County, Alabama, *E. J. Palmer*, no. 38,997 (as *Heuchera villosa*), sepals 2.3–2.4 mm. long. *T. cordifolia*, var. *typica* from Wilton, New Hampshire, May 11, 1886, *M. A. C. Livermore*, sepals 2–2.2 mm. long; from Charlemont, Massachusetts, May 15, 1915, *Churchill & Woodward*, sepals 2.4–2.6 mm. long; from Becket, Massachusetts, *Fernald*, no. 15,172 (type of forma *parviflora*), sepals 1.8–2.2 mm. long. Since northern stoloniferous *T. cordifolia* may have the sepals down to 1.8 mm. long, while southern nonstoloniferous *T. Wherryi* may have them up to 3 mm. long and 1.3 mm. wide (as well as obtuse), I find myself unable to recognize a specific difference in the sepals.

Dr. Wherry finds that from his Piedmont and Coastal Plain *Tiarella cordifolia*, var. *collina* "The likewise non-stoloniferous *T. wherryi* differs in flowering later", and it is a very striking fact that the type of *T. Wherryi* in young anthesis was collected in Polk County, Tennessee, on June 12. The type-station is a ravine of Hiwassee Beach, between the Unaka Mountains and Beans Mountain, consequently relatively cool and backward. If the non-stoloniferous plants of Tennessee and Alabama are, as seems to be the case, *T. Wherryi*, it becomes important to note the flowering period of other specimens. TENNESSEE: Sevier County (Gatlinburg, not far from the Great Smoky Mountains), April 27, *Sharp*, in flower; Knoxville, Knox County, May 29, *Ruth*, no. 341, fruit and lingering flowers; Cumberland County, May 12, *Weatherby & Weatherby*, no. 6249, fruit and last flowers; Grundy County, alt. 1500 ft., April 27, *Svenson*, no. 7653, flowers; Marion County, May 13, *Svenson*, no. 10,056, flowers; Cheatham County, April 24, *E. J. Palmer*, no. 35,506, flowers. ALABAMA: Tuscaloosa County, April 19, *Harper*, no. 3490, flowers; Marion County, April 21, *E. J. Palmer*, no. 38,997, flowers. When we take the flowering material of the non-

stoloniferous plant from the Blue Ridge east to the Coastal Plain which has come to the Gray Herbarium we get the following score. VIRGINIA: Amelia County, May 2, *J. B. Lewis*, no. 87, flowers; May 21 *Lewis*, no. 89, young fruit and lingering flowers; Brunswick County, May 4, *Lewis*, no. 3410, buds, flowers and young fruit; Henry County, May 6, *Baldwin*, no. 242, flowers. NORTH CAROLINA: Durham County, April 12, *Correll*, no. 5049, flowers; May 4, *Godfrey*, no. 3809, young fruit with lingering flowers; Wake County, April 11, *Godfrey*, no. 3424, flowers; Mecklenburg County, April 26, *C. H. Knowlton*, buds and young flowers. From these facts it can only be surmised that Dr. Wherry's series of later-flowering *T. Wherryi* came from cooler habitats than much of the material collected by others.

Tiarella Wherryi was distinguished by Dr. Lakela by the "fructus carpellis 5–10 mm. longis . . . abrupte rotundatis ad rostellum angustum". Here is a real morphological character which seems to hold, and all the mature fruit of the Piedmont and Coastal Plain plant before me has the short and broad round-tipped valves. Northern and typical *T. cordifolia*, on the other hand, has the fruit often more elongate, 6–12 mm. long, the relatively narrow valves more lance-oblong and gradually tapering to subacuminate at tip. The stoloniferous typical *T. cordifolia*, furthermore, has the lower fruiting pedicels 7–13 mm. long; the lower pedicels of the nonstoloniferous southern series are somewhat shorter (6–10 mm. long). In typical *T. cordifolia* the tip of the filament (after disarticulation of the anther) is relatively blunt; in the nonstoloniferous southern plant the filament is more slenderly tapering at summit. All in all, the short and round-tipped fruit and the slight differences in length of pedicels and in tip of filament mark a southern nonstoloniferous plant, *T. Wherryi*, as distinguished from a more northern stoloniferous one, *T. cordifolia*. Differentiation of the nonstoloniferous plants from east of the Alleghenies from a similar plant, with inseparable technical characters but occurring west of the Alleghenies, seems artificial. It is reminiscent of the artificial separation of like plants as two species, one occurring "east of the Continental Divide", the other west of it, or the too familiar key-characters, "eastern" versus "western".

*Philadelphus inodorus L. Caroline County: steep wooded bluff by Rappahannock River, northeast of Return, *Fernald, Long & Fogg,* no. 14,168, spread from cultivation. See p. 358.

Hamamelis virginiana L., var. parvifolia Nutt. Local range extended into Southampton County: dry woods near Johnson's Millpond north of Sedley, nos. 14,336 and 14,337, strongly contrasting with typical *H. virginiana* growing with it.

*× Pyrus Lecontei Rehder (*P. communis* L. × *pyrifolia* (Burm.) Nakai). Princess Anne County: large shrubs persisting in clearing about old house, Cedar Island, no. 12,361. Essex County: border of dry woods northeast of Loretto, *Fernald, Long & Abbe,* no. 14,169. Southampton County: border of woods 1 mile south of Branchville, no. 10,277.—Identifications kindly supplied by Professor Rehder, who informs me that this hybrid was extensively introduced by Le Conte.

*Malus angustifolia (Ait.) Michx., var. puberula Rehder. Surry County: dry oak and pine woods southwest of Spring Grove, *Fernald, Long & Abbe,* no. 14,170; dry oak and pine woods southwest of Savedge, *Fernald, Long & Abbe,* no. 14,171, tree 25 feet high, with trunk 6 inches in diameter. Identifications kindly supplied by Professor Rehder, who states that the only material he had previously seen was from Louisiana and Mississippi.

Although I here enter *Malus angustifolia* as a species of *Malus* in deference to Professor Rehder who made the identifications, the so called generic distinctions between the subgenera or sections of *Pyrus* sensu DeCandolle, Endlicher, Bentham & Hooker, Focke, Engler & Prantl, Gray, Bailey and others are no different now than they were when those students of worldwide relationships treated them as all belonging in the single genus *Pyrus.* In Rehder's Manual, ed. 2, the key to genera gives these distinctions:

Styles connate at base: fr. usually apple-shaped, without or with few grit-cells ..... 26. *Malus.*
Styles free: fr. usually pear-shaped, its flesh with numerous grit-cells ..... 30. *Pyrus.*

Much hangs on the shape of an apple, whether the depressed-globose of the old fashioned Russet or the elongate ovoid of a Gilliflower. Similarly, although the obovoid form of most of our commonly cultivated pears is familiar, one has to look no farther than Hedrick's Pears of New York to see beautiful life-sized plates of ovoid to globose pears: globose-ovoid, suggesting a

Hubbardston apple, in *Pyrus serotina;* globose as a cherry in *P. betulaefolia;* depressed-globose, like a conventional apple, in "Gansel Seckel" and even more depressed in "Idaho". In fact, of the Pears treated in Rehder's Manual ("fr. usually pear-shaped") 13 out of the 15 species have the fruit described as "globose" "globular" "subglobose" or "ovoid"; while such a species as *Malus Halliana* is described in Rehder's key as having "fr. pyriform". The terms "apple-shaped" and "pear-shaped" thus become a bit vague. Since, furthermore, two sections of *Malus*, as accepted by Rehder, have grit-cells, we get down to styles connate at base in *Malus*, free in *Pyrus*, and another character: "lvs. . . folded or convolute in bud" in *Malus*, "involute in bud" in *Pyrus*. These, if absolutely constant, are much sounder characters than shape of fruit. I have not sufficient knowledge of the many species to be sure whether these characters are absolute. Many wise taxonomists of the past and the present have doubted their value as full generic differences, when there is so much variation in other characters. It is often said that apples and pears do not hybridize; that that is a sure test. Therefore, since *Sorbus* and *Aronia* do hybridize, keep them apart as genera and set up a new genus, × *Sorbaronia* Rehder, for their hybrid offspring, just as the genus × *Sorbopyrus* has been set up for the hybrid of *Pyrus communis* and *Sorbus aria*. Neither the failure of some groups to cross nor the occurrence of crosses between ordinarily quite distinct genera is the final test. So many proven cases of incompatability within genera have been noted that one can hardly argue that incompatibility necessarily demonstrates distinctness of genera; and when such utterly unrelated genera as *Cyperus* and *Rhynchospora* have sometimes crossed, producing × *Cyperus Weatherbianus* Fern., we do not merge the two genera.

If *Pyrus*, *Malus*, *Sorbus* and *Aronia* are distinct genera are not *Azalea* and *Therorhodion* equally separable from *Rhododendron; Polycodium* and *Cyanococcus* from *Vaccinium; Amygdalus* and *Cerasus* from *Prunus*? These subgenera have quite as many and as sound morphological characters. I am inclined to follow DeCandolle, Endlicher, Bentham & Hooker, Focke, Engler & Prantl, Gray and Bailey until much stronger cases are presented for the generic segregation of Pyrus in its inclusive sense. Mor-

phologically its elements are no more discordant than those of *Pinus* and *Quercus*.

*Psoralea psoralioides (Walt.) Cory, var. eglandulosa (Ell.) F. L. Freeman in Rhodora, xxxix. 426 (1937). Dinwiddie County: low open pineland, thickets and clearings just east of McKenney, no. 14,346. First from northeast of western South Carolina. See p. 366.

*Tephrosia virginiana (L.) Pers., var. glabra Nutt. ex Torr. & Gray, Fl. N. Am. i. 296 (1838). Hanover County: dry pine woods south of Ashland, no. 7460. Isle of Wight County: clearing in damp sandy pine barrens, south of Zuni, no. 14,345. Southampton County: dry sand of pine barrens about 7 miles south of Franklin, nos. 7459 and 7461. See p. 369.

Tephrosia virginiana, var. *glabra*, originally described from Georgia, occurs also in pine barrens or on sand-ridges of South Carolina (Clarendon County, *Godfrey & Tryon*, no. 1021) and in New Jersey. Whereas typical and wide-ranging *T. virginiana* has the internodes and leaf-rachises more or less villous, the villi either few or very numerous, the lower surfaces of the leaflets pilose to sericeous and the legume copiously long-villous, the internodes and rachises of var. *glabra* are at most closely short-hispid and often glabrate, the leaflets sparsely strigose to glabrous beneath and the legumes closely silky-strigose, not copiously villous. In eastern Virginia it seems to be the pine-barren extreme.

Recently some students have indicated the occurrence in the Atlantic States (New England and New York to South Carolina) of var. *holosericea* (Nutt.) Torr. & Gray, l. c., based on *T. holosericea* Nutt. in Journ. Acad. Sci. Phila. vii. 105 (1834) and I find many specimens in the Gray Herbarium from these states marked over as var. *holosericea*. So far as I can see they are nearly if not quite typical *T. virginiana*, the individuals with a few pin-point trichomes to be found on the upper surfaces of some leaflets. Nuttall's plant was a more definite variation than this: "whole plant sericeous, scarcely excepting the upper surface of the leaves. *Hab.* In the plains of Arkansas."—*Nuttall.* Torrey & Gray correctly defined it: "stem and raceme densely villous; leaflets very silky-pubescent on both sides". If we keep to the original accounts and restrict var. *holosericea* to the plants with "leaflets very silky-pubescent on both sides" (*i. e.* above as well as be-

neath) that variety assumes an inland range, from Michigan and Wisconsin to Texas, and we do not have to oversort the plants of the Atlantic States.

*Glycyrrhiza lepidota Nutt., var. glutinosa (Nutt.) S. Wats. Brunswick County: fallow field back of old Chamblis Place, Seward Forest, near Triplett, no. 14,483. A large patch, spreading extensively by long subterranean rootstocks, doubtless originally cultivated. This is the western extreme with glutinous foliage, the stems covered with stout glands and viscid setae. See p. 378.

Vicia caroliniana Walt. Local range extended northward to Dinwiddie County: low open pineland, thickets and clearings just east of McKenney, no. 14,350. See p. 365.

Polygala Senega L., var. latifolia Torr. & Gray. Brunswick County: oak-hickory woods back of old Chamblis Place, Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,484; the first from the southeastern section of the state. See p. 378.

P. sanguinea L. To the few and scattered stations in southeastern Virginia add a second one in Dinwiddie County: low open pineland, thickets and clearings just east of McKenney, no. 14,355. See p. 366.

*Euphorbia corollata L., var. paniculata (Ell.) Boiss. Henrico County: open thicket, South Richmond, no. 12,711. Extension north from North Carolina.

Acer floridanum (Chapm.) Pax. Brunswick County: very abundant in rich woods near Western Bridge, Meherrin River, south of Edgerton, *Fernald & Lewis*, no. 14,487. See p. 379.

Aesculus neglecta Lindl., var. pubescens Sargent. Greensville County: in great abundance in rich woods along Meherrin River, below Emporia, *Fernald & Lewis*, no. 14,537. See p. 383.

Previously misidentified from meagre shrubs farther down and to the north of the river as *Ae. discolor* Pursh, which should be dropped from the Virginia list.

Hypericum denticulatum Walt., var. ovalifolium (Britt.) Blake. To the few and remote stations add one in Southampton County: moist sandy and peaty shore of Whitefield's Millpond, southwest of Corinth, no. 14,366. See p. 373.

H. setosum L. Range extended inland to Brunswick County: wet level opening in flat woods, 1½ miles southeast of Triplett, August 18, 1942, and swampy old field south of Seward Forest, Triplett, August 5, 1943, *J. B. Lewis*. See pp. 374–376.

Viola cucullata Ait. Very local on or near the Coastal Plain southward. The following are our only stations. King

and Queen County: magnolia swamp about 2 miles northeast of St. Stephen's Church, *Fernald, Long & Abbe*, no. 14,203. Surry County: low woods, Cypress Swamp, near Sexton, *Fernald, Long & Abbe*, no. 14,204. See p. 358.

V. lanceolata L. To the few stations inland from the coast add one in Isle of Wight County: muddy and swaley shore, Darden's Pond, southeast of Collosse, no. 14,367.

V. lanceolata, var. vittata (Greene) Weath. & Grisc. To the few recorded stations add one in Southampton County: moist sandy and peaty shore of Whitefield's Millpond, southwest of Corinth, no. 14,368. See p. 373.

V. striata Ait. A second Coastal Plain station, this one in Greensville County: rich woods along Meherrin River, below Emporia, *Fernald & Lewis*, no. 14,538. See p. 383.

Rhexia ventricosa Fern. & Griscom. Range extended inland to Dinwiddie County: ditch bordering low open pineland just east of McKenney, no. 14,369. See p. 366.

*Oenothera tetragona Roth, var. riparia (Nutt.) Munz. Dinwiddie County: low open pineland, thickets and clearings just east of McKenney, no. 14,370. First from north of Wilmington, North Carolina. See p. 366.

Proserpinaca intermedia Mackenz. To the recorded Virginia station (near Lee Hall) add one in Southampton County: moist sandy and peaty shore of Whitefield's Millpond, southwest of Corinth, no. 14,373. See p. 373.

*Eryngium prostratum Nutt. Southampton County: moist sandy and peaty shore of Whitefield's Millpond, southwest of Corinth, no. 14,375. First from north of South Carolina. Identification tentative, the young fruit showing characters not surely matched in *E. prostratum*. Mature material is needed. See p. 373.

Zizia trifoliata (Michx.) Fern. (*Z. Bebbii* (C. & R.) Britt.). Brunswick County: oak-hickory-beach woods back of old Chamblis Place, Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,489. First from east of the mountains. See p. 378.

*Sium floridanum Small. Southampton County: wooded bottomland of Blackwater River, southeast of Ivor, no. 13,710, the arching or lopping stems left stranded after submergence and proliferating, the proliferous shoots producing simple leaves; sandy alluvial bottomland of Three Creek, Adams Grove, no. 14,376. Greensville County: wooded bottomland of Fontaine Creek, southeast of Taylor's Millpond, plants up to 7 feet high, no. 11,384, distrib. as *S. suave* Walt. See p. 368.

Sium floridanum, not recognized when Blake made the comparison, may be *S. suave* Walt. Whether it is a distinct species or a southern variety of the transcontinental northern as well as

southern plant which now passes as *S. suave* (*S. cicutaefolium*) is not wholly clear. The common northern and wide-ranging plant, which we call *S. suave*, has (except in the submersed forma *Carsonii* (Durand) Fassett and in the wholly atypical estuarine forma *fasciculatum* Fassett) the erect or ascending stem strongly corrugated; *S. floridanum* has the usually slender and more flexuous stem terete, in drying only slightly ribbed. In *S. suave* the stem branches near the summit, usually above the middle; the corrugate-angulate branches are strongly ascending; and the principal cauline leaves (below the branching) are strongly ascending, with 5–17 firm leaflets 4–15 cm. long. In *S. floridanum* the stem branches usually well below the middle, the terete branches are spreading-ascending to nearly horizontal; and the larger divergent to horizontally spreading leaves have 3–11 membranaceous leaflets 2–9 cm. long. In *S. suave* the largest (leading) umbel of each plant is 4–11 cm. broad, with angulate peduncle and 10–25 definitely angled (when dry) rays; in *S. floridanum* the more open fully developed umbels are 1–7 cm. broad, on filiform peduncles and with 7–15 filiform rays. In *S. suave* the angled pedicels of the umbellules are stiffly ascending; in *S. floridanum* the filiform pedicels are more curving or arching and prolonged. In flower and fruit the two are similar, but the petals of *S. floridanum* are narrower and the filaments and styles longer than in *S. suave*. As stated, when we have fuller material *S. floridanum* may prove to be a geographic variety, rather than a true species. The contrasts are here stated, that others may watch for this southern plant. As stated also, Walter could have had either as the basis of his *S. suave*.

Sium suave, forma *Carsonii*, the submersed and weak state of the wide-ranging transcontinental plant, has filmy foliage and small mostly infertile umbels. It might seem to some to include *S. floridanum;* but it is clearly demonstrated to be merely an ecological phase of *S. suave* (*cicutaefolium*). Its ascending petioles, its angulate-corrugated umbel-rays (when dry), its short and stiff pedicels, broadly rounded petals, short filaments and short style clearly show it to be *S. suave*.

Pyrola rotundifolia L., var. americana (Sweet) Fern. Brunswick County: wooded bluff along Rattlesnake Creek, west of Triplett, *Fernald & Lewis*, no. 14,538, healthy colony,

never flowering. Station at remarkably low altitude for southern Virginia. See p. 377.

*Vaccinium stamineum L., var. interius (Ashe) Palmer & Steyermark (*Polycodium interius* Ashe). Hanover County: dry sterile woods near Polegreen, no. 13,417 (fruit blue with a bloom). James City County: woods north of Jamestown Road, about 1 mile from Willamsburg, *J. T. Baldwin, Jr.* no. 206.

Var. *interius*, as its name implies, is a characteristic shrub of the Interior. The material (except for these sheets from eastern Virginia) in the Gray Herbarium is from West Virginia, Kentucky, Missouri, Arkansas, northern Louisiana, Kansas and Oklahoma. It is of course questionable if it is a true geographic variety, the characters ordinarily used in this series (genus *Polycodium*) being very plastic or fickle. In eastern Virginia we get three of these: typical *V. stamineum* with the young branchlets pilose, the mature leaves somewhat so on the lower surface or the lateral veins, a very common plant; var. *interius* with young branchlets pilose but the leaves glabrous except along the midrib beneath; and the common var. *neglectum* (Small) Deam, with young twigs and leaves both quite glabrous. *V. caesium* Greene, a low shrub (commonly only 2–5 dm. high) of sandhills and pine barrens closely approaches the state in North Carolina, and may be watched for with confidence. Its small and broad leaves (1.5–5 cm. long) and the very large and rounded bracts (1–2 cm. broad) greatly exceeding the subtended pedicels well mark it. The group is by no means properly understood, and the varieties (species of Greene, Ashe and Small) may prove to be minor forms without good geographic ranges.

*V. virgatum Ait. Southampton County: dry white sand in oak and pine woods and clearings bordering Assamoosick Swamp, south of Sebrell, no. 10,374, as *V. Elliottii* Chapm.—shrubs 2 m. high. Originally, on account of its stature, placed in *V. Elliottii* but differing clearly from that species, which has the leaves lustrous and full green on both surfaces, membranaceous and without reddish glands and gradually rounded to base, by its firmer leaves subcuneate at base, reddish glandular hairs mixed with the pilosity of the lower surface, and the very stiff and compact branching. It fairly matches more southern material identified by Gray and later by Camp as true southern *V. virgatum*.

*V. vacillans Torr., var. crinitum Fern. Surry County: dry thicket 1 mile north of Surry Courthouse, no. 10,773, narrow-leaved extreme.

Camp has renamed *Vaccinium vacillans* as originally and beautifully described by Torrey, Fl. N. Y. **1:** 444 (1843). In its place he publishes the very appropriate *V. Torreyanum* Camp in Am. Midl. Nat. xxiii. 177 (1940) = "*Vaccinium vacillans* Torrey, Fl. N. Y. **1:** 444. 1843 (non exemp. in Mus. Brit.)" and to *V. pallidum* Ait. he refers "*Vaccinium vacillans* Kalm, apud Torrey, Fl. N. Y. **1:** 444. 1843 (typ. in Mus. Brit. est)."

Torrey, unfortunately, gave to the familiar shrub so clearly described from New York state an old herbarium-name, *V. vacillans* "*Kalm, mss. in Herb. Banks*". The latter is worse than a *nomen nudum*. It had never been published even as a *nomen* and, surely, Torrey had not seen it in Banks's herbarium, since he did not go abroad. At best he had hearsay knowledge of it. I am, therefore, unable to see that a mere herbarium-name, given by Kalm to something which Torrey had not seen and which, according to Camp's note, he wholly misunderstood, takes precedence over the material from "the vicinity of New York" which Torrey so fully and accurately described. I retain the name *V. vacillans* as of Torrey. Had the name *V. vacillans* been accompanied by a description of Kalm's material or had it been previously published, it would stand for that element. Since Torrey, who first took up the name, described only the New York element, which Kalm did not have, the name is typified by Torrey's material, the only material described.

STYRAX AMERICANA Lam. To the relatively few stations in Virginia add one in SUSSEX COUNTY: upper border of sandy beach, Airfield Millpond, southwest of Wakefield, no. 14,383. See p. 372.

*CYNOCTONUM SESSILIFOLIUM (Walt.) J. F. Gmel. BRUNSWICK COUNTY: wet level opening in woods, 1½ miles southeast of Triplett, August 24, 1942, *J. B. Lewis*. See pp. 374 and 376.

POLYPREMUM PROCUMBENS L. It is so often stated that *Polypremum* is an annual ("much branched small annual"—Gray, Man.; "annual diffuse herb"—Small, Man.) that the correct description of Gray, Synopt. Fl., should be emphasized: "much branched from an annual (sometimes almost ligneous) root." In sandy clearings of Brunswick County the mature plants, late in the autumn, send out vigorous and crowded new basal offshoots, much as in *Lechea* (see *Fernald & Lewis*, no. 14,492).

AMSONIA TABERNAEMONTANA Walt. Local range extended to BRUNSWICK COUNTY: rich wooded slope below Western Bridge,

Meherrin River, south of Edgerton, *Fernald & Lewis*, no. 14,491. See p. 380.

*Asclepias lanceolata Walt., var. paupercula (Michx.) Fern., forma **flaviflora,** floribus flavis. Norfolk County: fresh reed-marsh and swale along Northwest River near Northwest, June 30, 1942, *Fernald & Long*, no. 14,390—a single plant associated with the rather abundant typical var. *paupercula* in which the hoods are deep orange to scarlet. Type in Herb. Gray. See p. 368.

*Acerates viridiflora (Raf.) Eaton, var. lanceolata (Ives) Gray. Prince George County: argillaceous field north of Fort Hell, south of Petersburg, very scarce, no. 12,778. Sussex County: open thickets and clearings near Nottoway River at Readjuster Bridge, south of Peanut, no. 12,438.

Acerates viridiflora is excessively variable in foliage but all the material before me from southern New England and southern New York southward to the Carolinas, with the exception of five numbers from eastern Pennsylvania (Phil. Acad.) and the two numbers above cited, has the blunt or abruptly short-tipped leaves elliptic, oblong, oval or oblong-obovate and is, I take it, true *A. viridiflora.* Rafinesque's original description called for a "lanceolated, obtuse" leaf, "leaves lanceolated, obtuse, hirsute, umbells axillar, bending down, corniculas, without appendices. I have found it in several parts of Maryland and Pennsylvania, mostly in fields." In view of the oblong, elliptic or oblong-obovate outline of the obtuse leaves in the plant of Pennsylvania and Maryland, it is assumed that Rafinesque's "lanceolated" was used with poetic license.

In the representation in the Gray Herbarium there is no material of this obtuse-leaved plant from the north-central states. It occurs in North Carolina (Small implies Florida), Louisiana, Texas and New Mexico, northward in the Mississippi drainage to Kentucky and Kansas. From southern Ontario to Manitoba and Wyoming the usual plant has lanceolate to narrowly ovate leaves tapering from near the base to acuminate or prolonged acute tips. This is var. *lanceolata* (Ives) Gray, occurring from southern Ontario, Manitoba and Wyoming southward to Louisiana, Texas and New Mexico, in the South mingling with the obtuse-leaved plant. I am quite unable to separate the two numbers from Virginia and some from southeastern Pennsylvania from characteristic var. *lanceolata* of the Interior. In the East

they look like mere leaf-variations of one plant. In view of the very different broad ranges of the two, however, I am making this note, especially with the hope that the plants will be carefully checked elsewhere in the East.

PHLOX NIVALIS Lodd. (*P. Hentzii* Nutt.) An extensive station in GREENSVILLE COUNTY: dry sandy woods along Fontaine Creek, Round Hill Church, *Fernald & Lewis*, no. 14,543. See p. 383.

P. CAROLINA L., var. TRIFLORA (Michx.) Wherry. Another station in DINWIDDIE COUNTY: low open pineland, thickets and clearings just east of McKenney, no 14,393. See p. 365.

NEMOPHILA MICROCALYX (Nutt.) Fisch. & Mey. This vernal annual, characteristic along the James, is also in GREENSVILLE COUNTY: rich woods along Meherrin River, below Emporia, *Fernald & Lewis*, no. 14,542, growing with the abundant *Phacelia dubia* and very luxuriant (up to 4.5 dm. high). See p. 383.

HYDROLEA QUADRIVALVIS Walt. Range extended inland to BRUNSWICK COUNTY: swampy pond-hole in woods, Rattlesnake Creek, west of Triplett, *Fernald & Lewis*, no. 14,493. See p. 377.

MYOSOTIS VERNA Nutt. Local range extended. JAMES CITY COUNTY: rich woods and slopes by James River, Grove Landing, southeast of Grove, FERNALD, LONG & ABBE, no. 14,227. SUSSEX COUNTY: fallow field along Nottoway River at Readjuster Bridge, south of Peanut, *Fernald, Long & Abbe*, no. 14,228.

SCUTELLARIA SERRATA Andr. BRUNSWICK COUNTY: rich wooded slope near Western Bridge, Meherrin River, south of Edgerton, *Fernald & Lewis*, no. 14,494. See p. 380. Epling, in his American Species of Scutellaria, Univ. Cal. Pub. Bot. xx. no. 1, 85 (1942) cites no Virginia specimens from the southern counties east of the Blue Ridge.

*PHYSOSTEGIA **aboriginorum,** sp. nov. (TAB. 783), planta robusta 10.5–12 dm. alta basi valde surculoso; caule glabro ad basin 0.8–1 cm. diametro; foliis firmis sessilibus vel imis late subpetiolatis oblongis obtusis vel subacutis undulato-sinuatis, primariis 8–11 cm. longis 1.7–2.5 cm. latis; inflorescentia paniculata, ramibus lateralibus prolongatis arcuato-adscendentibus; spicis subdensis 0.4–2 dm. longis, calycibus fructiferis imbricatis, rhachi puberula; calycibus breviter campanulatis puberulis, tubo maturo 5–6 mm. longo, dentibus deltoideis; corollis purpureis 2–2.5 cm. longis fauce ampliato 8–10 mm. diametro; filamentis ad apicem villosis.—Norfolk County, VIRGINIA: swale at margin of Indian Creek (whence the specific name), northeast of Northwest, June 30, 1942, *Fernald & Long*, no. 14,397 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). See p. 368.

Physostegia aboriginorum differs strikingly from the more fre-

quent species of southeastern Virginia (of the Blackwater and the Nottoway drainage-systems) in its broader-oblong, merely undulate-margined, firm sessile leaves, the lower ones narrowed merely to dilated bases, the upper ones but slightly reduced in size; the panicled spikes densely flowered, with imbricated pairs of fruiting calices; the corolla more ampliate; the filaments copiously pilose to summit. *P. denticulata* (Ait.) Britton (our PLATE 784, FIG. 1), common in the alluvium of the Nottoway or the Blackwater and their tributaries in Southampton, Isle of Wight and Nansemond Counties, has the leaves thin and membranaceous, the lower 4 to 6 pairs oblanceolate or oblong and on long slender petioles, the middle and upper ones sessile and long-attenuate at tip, the uppermost very small. Its usually solitary, slenderly elongate spike is very interrupted, the pairs of flowers and fruiting calices remote; the corolla more slender, the filaments glabrous or only sparsely pilose at tip.

From *Physostegia leptophylla* Small the Norfolk County plant differs in its much larger leaves in more scattered and more sessile pairs, with merely undulate margins, and in its more slender corolla, *P. leptophylla* having the many (up to 16) pairs of more prominently dentate leaves mostly narrowed to base and the greatly distended corolla with throat 1.5 cm. broad at summit. From *P. veroniciformis* Small *P. aboriginorum* differs in much greater size, the leaves not fiddle-shaped, the calyx-lobes short and deltoid, instead of elongate and lanceolate, the corolla larger, and the long, as well as the short, filaments hairy.

This segregation of species of the Northwest River and its tributary, Great Dismal Swamp, and the North Landing River drainage, with small tributaries interlocking with those of the Northwest River, both emptying into the head of Currituck Sound, is very real. The Blackwater and Nottoway merge at the State Line to form the Chowan, which, a few miles farther south receives the Meherrin and then empties into Albemarle Sound. On the bottomlands or wooded slopes of the Blackwater, Nottoway or Meherrin on the Coastal Plain of Virginia hundreds of species occur which we do not know from the bottoms, swamps and marshes of the more eastern drainage systems. Conversely the Northwest and North Landing drainage (or that of Back Bay slightly to the east) have scores (many

more yet to be discovered) of plants which we do not know from the Blackwater, the Nottoway or the Meherrin drainage (*Pinus serotina*, *Limnobium Spongia*, *Arundinaria gigantea*, *Andropogon virginicus* var. *glaucopsis*, *Scleria flaccida*, *Cladium jamaicense*, *Wisteria frutescens*, *Ilex vomitoria*, *I. coriacea*, *Stewartia Malachodendron*, *Ludwigia pilosa*, *L. alata*, *Asclepias lanceolata* var. *paupercula*, *Lobelia elongata*, *Eupatorium recurvans*, *E. cuneifolium*, *Aster Elliottii*, etc.). *Physostegia aboriginorum* is the latest addition to this series.

I am using the name *Physostegia denticulata* in its traditional sense. Originally published as *Dracocephalum denticulatum* by Aiton, Hort. Kew. ii. 317 (1789) from Carolina material, its diagnosis was good, though very brief: "D. floribus spicatis remotis, foliis obovato-lanceolatis superne denticulatis". Such a plant abounds, as stated, on the Coastal Plain bottomlands of the Blackwater and the Nottoway, thence south to Florida, represented in the Gray Herbarium by material from five counties of North Carolina: Hertford, on the Chowan River, and Perquimans, draining into Albemarle Sound; thence south to the region of Wilmington, and from Georgetown County, South Carolina. The general geographic source of Aiton's material is unequivocal.

In RHODORA, xvii. 134 (1915) Blake, publishing the combination *Physostegia purpurea* (Walt.) Blake, based on *Prasium? purpureum* Walt. Fl. Carol. 166 (1788), identified it with *P. denticulatum*. Walter's diagnosis was as follows: "foliis oppositis sessilibus lanceolatis dentatis, floribus purpureis, spicis distichis terminalibus"; and the very sketchy sketch (our PLATE 785, FIG. 1) made by Blake of the type of *Prasium? purpureum* is difficult to match in any material usually placed in *Physostegia denticulata*. Blake's description (mss. in Gray Herb.) of the specimen says "leaves . . . 3 mm. wide . . . Corolla would be just 2 cm. long if straightened out . . . It agrees very well with Drummond 251, *e. g.* in Brit. Mus." Now it so happens that Drummond's no. 251 from New Orleans (our PLATE 785, FIGS. 2–5) has elongate-linear leaves very strongly suggesting Blake's sketch of the much crumpled Walter type, but it has finely sharp-serrate margins (FIG. 5) and is a quite characteristic specimen of a wide-ranging species (our PLATE 785,

FIGS. 6 and 7) which occurs from Tennessee to Illinois and Arkansas, south to Mississippi, Louisiana and Texas, the plants variously misidentified as *P. denticulata*, *P. virginiana* (L.) Benth. ("very slender form") and *P. speciosa* Sweet. Furthermore, a habitally quite similar species, *P. intermedia* (Nutt.) Engelm. & Gray (our PLATE 784, FIGS. 2 and 3), with slender and interrupted spike and with leaves narrowly lanceolate to linear but with flowers relatively small, extends eastward into Kentucky and Alabama. This small-flowered species has the leaves dentate, as described by Walter for *Prasium? purpureum*, not acutely serrate as in *Drummond*, no. 251; but, so far as we know, neither of these sessile- and narrow-leaved species is east of the mountains. With no such plant as indicated by Blake's sketch (PLATE 785, FIG. 1) now known in Walter's territory, it is unsafe to assert with confidence just what his *Prasium? purpureum* is. Until Walter's type can be rechecked with Drummond's no. 251 (with linear, sharp-toothed leaves and slender, interrupted spikes) clearly in mind there must remain some doubt regarding its identity with *Physostegia denticulata*. Until his type can be reexamined and closely compared with a series including all known species of the Carolinas, as well as *Drummond*, no. 251 and *Physostegia intermedia*, it is safest to let the name rest, as it did until Blake took it up, as still of doubtful significance.

I am, therefore, at the risk of possibly publishing a species already inadequately described, proposing

P. **angustifolia,** sp. nov. (TAB. 785, FIG. 2–7), planta erecta caule glabro 3–10 dm. alto; foliis rigidis griseis vel pallidis linearibus vel anguste lanceolatis sessilibus numerosis (16–22 jugis), imis obtusis vel subacutis, mediis attenuatis valde angusteque adpresso-serratis 4–10 cm. longis 3–10 mm. latis, foliis supernis valde reductis; spicis solitariis vel paniculatis elongatis ad 3.5 dm. longis floribus distantibus, rhachi puberulo; calycibus campanulatis 6–10 mm. longis pruinoso-puberulis glandulosisque dentibus deltoideis acuminatis; corollis purpureis vel albescentibus 2.5–3 cm. longis.—TENNESSEE: thickets along fence, Lavergne, Rutherford County, August 12, 1922, *Svenson*, no. 242. MISSISSIPPI: roadside bank near Egypt, Chickasaw County, May 18, 1933, *C. A. & Una F. Weatherby*, no. 6318, TYPE in Herb. Gray. ILLINOIS: Arlington Heights, Cook County, August 25, 1934, *Benke*, no. 5680; prairie, South Chicago, September 15, 1910, *Lansing*, no. 2803; Champaign, September 11, 1909, *Pease*, no. 12,403; LaSalle County, *Huett;* Sugar Creek Prairie, Richland

County, September 5, 1914, *Robert Ridgway*. ARKANSAS: moist roadside and ditch-bank, Fayetteville, June 13, 1938, *Fassett & Nielsen*, no. 19,829; low ground, northwestern Arkansas, June, *F. L. Harvey*, no. 116. LOUISIANA: Covington, May and June, *Hale;* New Orleans, 1832, *Drummond*, no. 251. TEXAS: de Bejar à Austin, Avril, 1828, *Berlandier*, no. 466; Amelia, Jefferson County, October 5, 1934, *Cory*, no. 11,108; Kerrville, Kerr County, June 25, 1894, *Heller*, no. 1906; 8 miles south of Bandera, Bandera County, June 5, 1933, *Cory*, no. 6607.

Most of the material (including many specimens not cited) has been distributed as *Physostegia virginiana* (L.) Benth., but that, as shown by a beautiful photograph of the type before me, is the common northeastern plant with relatively thin, lanceolate, often copiously and saliently serrate leaves mostly 1–2.5 cm. wide, the uppermost much reduced, the flowers in relatively short and crowded spikes (in fruit with imbricated calices and rarely 2 dm. long), the corolla 2–3 (in the type 2.4) cm. long. It has also been called *P. virginiana* var. *speciosa* (Sweet) Gray, but that is a variation of *P. virginiana* with broader and often more prominently serrate leaves, the larger blades 2–4 cm. wide and less reduced in size toward the summit of the stem. Sweet's original plate shows the corolla 2.5 cm. long.

Relatively small plants of *Physostegia virginiana* from the lower Susquehanna in southeastern Pennsylvania have sometimes been called *P. denticulata* because their leaves have the marginal teeth few and short. Similar forms, with low stature, small leaves and reduction of teeth, abound about Lake Champlain and in the vicinity of Montreal on the St. Lawrence. Others from the same regions and of similar proportions have well developed sharp teeth. They seem to be a reduced state of *P. virginiana*, somewhat atypical but without constant enough characters to merit specific recognition. The designation of the individuals of this small extreme of tidal shores of the St. Lawrence as a distinct species, *P. granulosa* Fassett in RHODORA, xli. 377 (1939), our PLATE 786, FIGS. 1 and 2, because it is stoloniferous and because its calyx is more glandular-puberulent than in some *P. virginiana*, overlooks the fact that carefully collected *P. virginiana* has stolons. Witness specimens of *Fernald & Long*, no. 14,465 from Hampden, Maine, of *Fassett*, no. 14,341 (our PLATE 786, FIGS. 3 and 4) from Bingham, Maine (toward 50 miles up-

river beyond the limit of tide and with leaves as small as and with fewer teeth than in isotypes of *P. granulosa*—in no. 14,341 some leaves with as few as 2–5 low teeth on each side, the type of *P. granulosa* described as with 4–8 but the isotypes in the Gray Herbarium showing 5–9 pairs of teeth), of the Faxons and others from Lake Champlain (PLATE 786, FIG. 5), of Eames from Trumbull, Connecticut, or of any other botanist who takes pains carefully to collect the stolons. The small extreme with small leaves having few and low teeth and the pubescence of the calyx short and glandular is noteworthy but scarcely a good species. I am calling it

P. VIRGINIANA (L.) Benth., var. **granulosa** (Fassett), stat. nov. *P. granulosa* Fassett in RHODORA, xli. 377 (1939). PLATE 786.

On the St. Lawrence var. *granulosa* is on areas covered by high tide; the lower part, at least, of its range on the Susquehanna is tidal shore; on Lake Champlain, where the variety abounds, and on the middle and upper Kennebec it is in areas which have had no extensive tides since the Champlain Subsidence, at which time a fresh arm of the sea entered Lake Champlain and a tongue extended well up the Kennebec. Can it be that the variety originated on Lake Champlain and the upper Kennebec at that period?

PLATE 783. PHYSOSTEGIA ABORIGINORUM Fernald: FIG. 1, TYPE, × ½; FIG. 2, flower, × 2; FIG. 3, mature calices and rachis, × 5.

PLATE 784. P. DENTICULATA (Ait.) Britton: FIG. 1, characteristic plant, × ⅖, from Monroe Bridge, Nottoway River, Southampton County, Virginia, *Fernald & Long*, no. 13,122. P. INTERMEDIA (Nutt.) Engelm. & Gray: FIG. 2, plant, × ½, from Lake City, Craighead County, Arkansas, *Demaree*, no. 5089; FIG. 3, leaf-margin, × 2, from no. 5089.

PLATE 785. PHYSOSTEGIA: FIG. 1, tracing of leaf of type of *Prasium? purpureum* Walt., by Blake. PHYSOSTEGIA ANGUSTIFOLIA Fern.: FIGS. 2–5, *Drummond*, no. 251, × 5/9, said by Blake to match Walter's type of *Prasium? purpureum* (FIG. 1), which is also said to be *Physostegia denticulata* (see PL. 784, FIG. 1); FIG. 5, leaf of no. 251, × 2; FIG. 6, TYPE of PHYSOSTEGIA ANGUSTIFOLIA, × 5/12; FIG. 7, portion of leaf, × 2.

PLATE 786. P. VIRGINIANA (L.) Benth., var. GRANULOSA (Fassett) Fernald: FIGS. 1 (× ½) and 2 (× 2), of isotype of *P. granulosa* Fassett, from Cap Rouge, Quebec, *Victorin*, no. 28,178; FIGS. 3 (× ½) and 4 (× 2) from Kennebec River, Bingham, Maine, *Fassett*, no. 14,341; FIG. 5, × ½, from Lake Champlain, South Hero, Vermont, *Hunnewell*, no. 13,902.

STACHYS CLINGMANII Small. SURRY COUNTY: rich alluvial woods and thickets back of sand-beach of James River, below Sunken Meadow Beach, no. 8446; thicket back of sand-beach of Cobham Bay, James River, northwest of Chippokes, no. 12,788.

Both numbers have been erroneously reported in previous records as *Stachys Nuttallii* Shuttlew. The latter species of western North Carolina and eastern Tennessee has the sides of the stem minutely glandular-puberulent, the sessile or subsessile leaves glabrous beneath, the glandular and short-pilose calyx with broadly deltoid teeth. Our plant, also of the mountains, thence westward to Illinois, is the *S. Nuttallii* sensu Robinson & Fernald in Gray, Man. ed. 7. Its stems are glabrous on the sides, the membranous leaves slender-petioled and copiously hispid on the veins and veinlets beneath, the calyx glandular and minutely pilose, with narrow teeth long-subulate at tip. On the lower James it is as notable an isolation from the Appalachian Upland as if it were really *S. Nuttallii*.

*S. TENUIFOLIA Willd. CHARLES CITY COUNTY: alluvial woods along James River, Harrison Point, no. 9133. SOUTHAMPTON COUNTY; open sandy alluvial bank of Nottoway River, below Cypress Bridge, and wooded bottomland, Cypress Bridge, nos. 6370 and 8447. GREENSVILLE COUNTY: wooded alluvial bottomland of Meherrin River, near Haley's Bridge, no. 9418. See PLATE and MAP 1.

Apparently typical *Stachys tenuifolia* is not definitely recorded as Virginian. In his *Preliminary Revision of American Stachys* in Fedde, Repert. Sp. Nov. Beih. lxxx. 68 (1934), Epling gives the range "from Western New York and Southeastern Pennsylvania westward to Michigan and Minnesota, and Southwestward through Tennessee and Alabama to Louisiana and Texas". He could have extended it southeastward into Georgia; at least a characteristic specimen from northern Georgia, coll. *Chas. Wright*, correctly identified by Asa Gray and validated by Epling in 1931, is in the Gray Herbarium. True *S. tenuifolia* is, obviously, chiefly a plant of the Interior; its occurrence on the bottomlands of southeastern Virginia is another instance of a now familiar isolation, as is material from river-swamp of Santee River in Charleston County, South Carolina, *Godfrey & Tryon*, no. 728. Epling's only suggestion that *S. tenuifolia* occurs in Virginia is his note that "Specimens collected . . . by Killip (no. 6286) near Great Falls, Virginia, show an apparent intermixture with *S. hispida* chiefly in hairiness of the calyces and the more subulate calyx teeth". Such transitions to *S. hispida* are so frequent that I cannot feel that the two are distinct

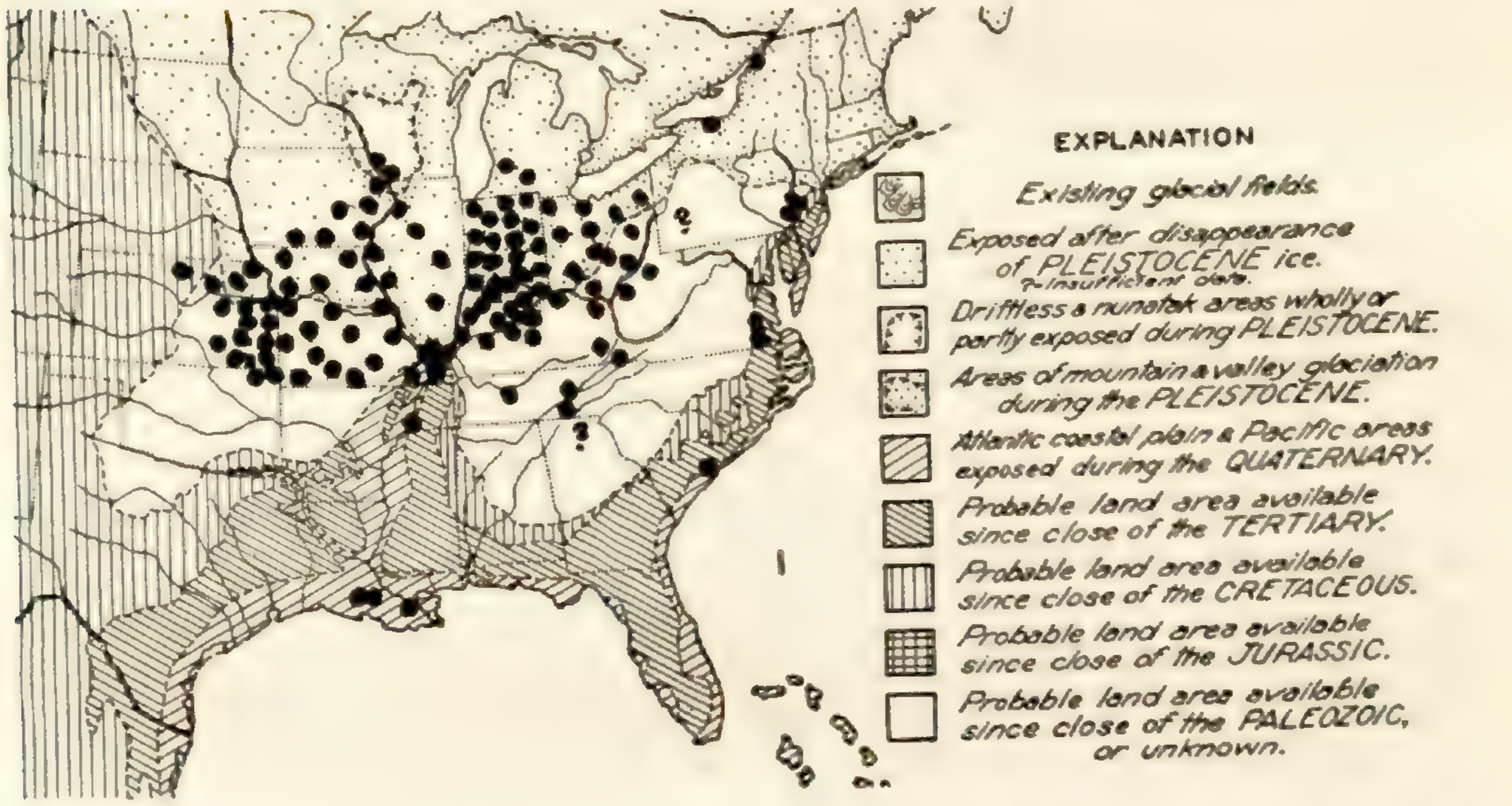
species, but are rather well pronounced geographic varieties. The following number from southeastern Virginia combines too intimately the characters of typical *S. tenuifolia* and those of typical *S. hispida*: Southampton County: bushy swales and borders of swampy woods near Blackwater River, Cobb's Wharf, no. 10,407. As I understand *S. tenuifolia* and *S. hispida* they are the two extremes of a rather polymorphous species, characterized by having the sides of the stem glabrous, the leaves with glabrous lower surfaces or with hispidity along the veins and veinlets but not on the intermediate tissue, and in the calyx being glabrous, or bristly only on the angles, its lance-attenuate teeth soon outwardly curving. As a polymorphous relatively southern species it is distinguished from the more northern (circumboreal) *S. palustris* L., in which the surfaces of the stem are pubescent, the leaves pilose to puberulent beneath, and the surfaces of the calyx pilose. My interpretation of *S. tenuifolia* is shown in the following brief synopsis.

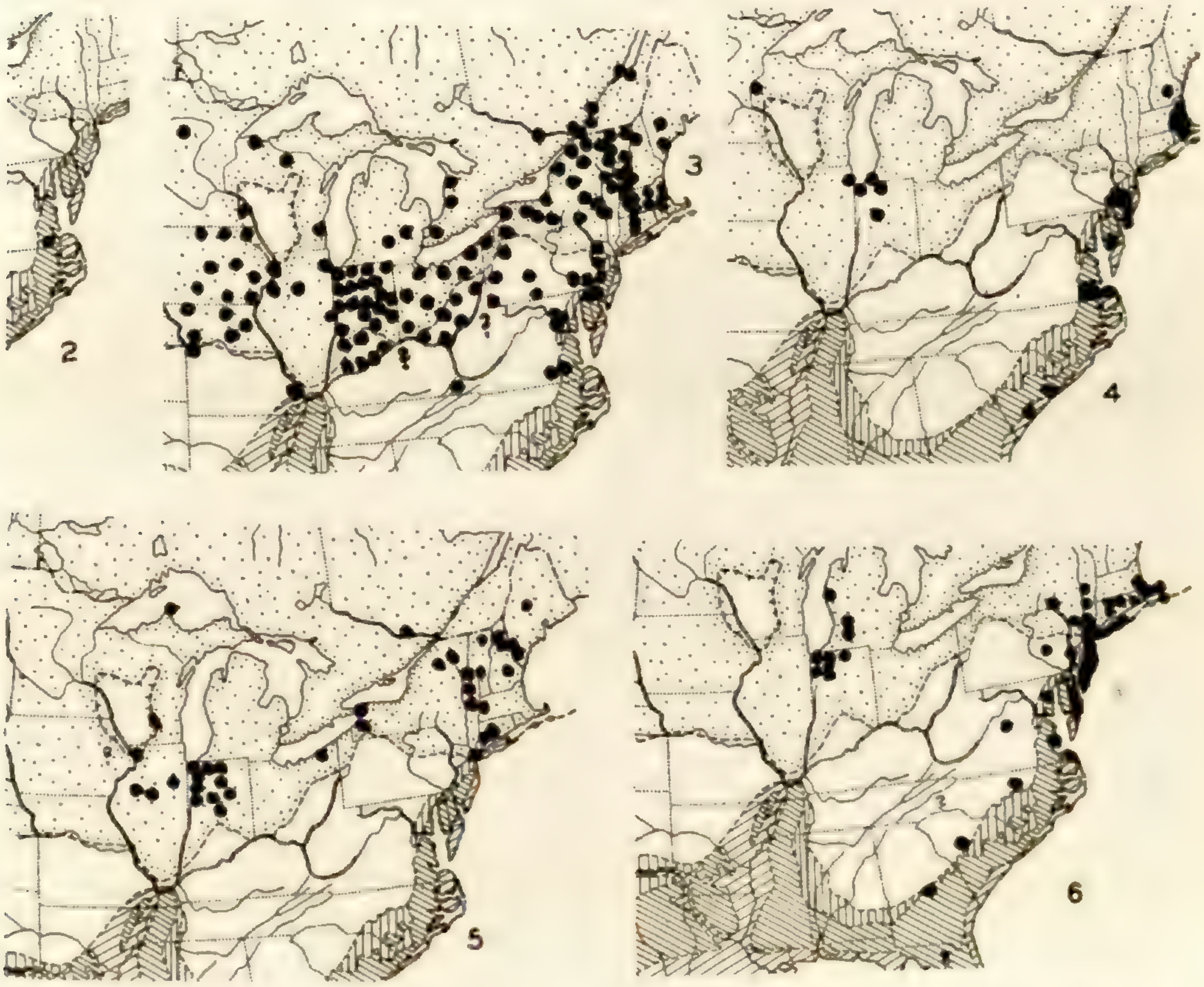
a. Bracts at base of glomerules of spike not ciliate; calyx glabrous throughout; leaves glabrous on both faces, the principal ones with slender petioles 0.5–3 cm. long.
Leaf-blades lanceolate to ovate-oblong or narrowly ovate, one fifth to three fifths as broad as long, the principal ones 4–10 cm. long and 1.2–6 cm. broad; spike stiff . . . . . *S. tenuifolia*, typical.
Leaf-blades narrowly oblong, about one sixth as broad as long; the median ones 1–1.5 dm. long and 1.6–2 cm. broad; spike flexuous . . . . . Var. *perlonga*.

a. Bracts bristly-ciliate; calyx often bristly on the angles; leaves often hispid on veins beneath, sessile, or the lower ones short-petioled.
Principal leaves broadly oblong to narrowly ovate, one third to three fifths as broad as long, 5–15 cm. long, 2–6 cm. broad, glabrous to sparsely strigose above. Var. *platyphylla*.
Principal leaves narrowly lanceolate to narrowly lance-oblong, one sixth to one fourth as broad as long, 3–10 cm. long, 0.8–2.4 cm. broad, mostly strigose above . . . Var. *hispida*.

S. tenuifolia Willd. Sp. Pl. iii. 100 (1800). *S. glabra* Riddell, Suppl. Cat. Ohio Pl. 16 (1836). *S. aspera*, var. *glabra* Gray, Syn. Fl. N. Am. ii[1]. 387 (1878). *S. cincinnatensis* Ktze. Rev. Gen. ii. 531 (1891).—Rich bottomlands, shores, low woods and meadows, New York to Minnesota, south to southeastern South Carolina, northern Georgia, Tennessee, northern Louisiana and eastern Texas. Plate 787 and map 1.

*Var. **perlonga,** var. nov. (tab. 788, fig. 1 et 2), var. typicae simillima; foliis anguste oblongis, mediis 1–1.5 dm. longis 1.6–2 cm. latis; spica flexuosa. Virginia: bottomland woods





Range of (1) STACHYS TENUIFOLIA; (2) S. TENUIFOLIA, var. PERLONGA; (3) S. TENUIFOLIA, var. PLATYPHYLLA; (4) S. TENUIFOLIA, var. HISPIDA; (5) S. PALUSTRIS. var. HOMOTRICHA (*S. ambigua* sensu Epling, not Sm.); (6) S. HYSSOPIFOLIA

along Meherrin River northeast of Gaskins, Greensville County, June 13, 1941 (foliage), August 8, 1941 (flowers and young fruit), nos. 13,128 and 13,435 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). MAP 2.

*Var. **platyphylla,** var. nov. (TAB. 789), caule ad angulos retrorse setoso; foliis primariis late oblongis vel anguste ovatis 5–15 cm. longis 2–6 cm. latis supra glabris vel sparse strigosis subtus ad venas hispidis vel glabris.—Low woods, rich shores and meadows, southern Quebec to Minnesota, south to eastern South Carolina, western North Carolina, Indiana and Illinois. The following, selected from a large series, are characteristic. QUEBEC: sur les rivages du Fleuve St.-Laurent, St.-Francois, Ile d'Orleans, 13 juillet 1935, *Victorin et al.*, no. 43,661; rivages Fl. St.-Laurent, Berthier en Bas, 3 août 1925, *Rousseau,* no. 21,610; Valleyfield, Co. Beauharnois, 6 septembre 1930, *Victorin, & Rolland,* no. 33,953; rivage, Ile Plate, Longueuil, 28 août 1928, *Victorin*, no. 28,272. MAINE: East Livermore, July 5, 1909, *Kate Furbish;* by small pond, Portland, June 20, 1909, *Fernald,* no. 2158. NEW HAMPSHIRE: bank of Connecticut River, Stratford, September 3, 1909, *Pease*, no. 17,705. VERMONT: pebbly lake-shore, Highgate Springs, July 19, 1938, *Pease*, no. 26,746; sandy shore of Connecticut River, Norwich, July 11, 1910, *E. F. Williams* (TYPE in Herb. Gray.); sandy bank, Burlington, July 8, 1914, *C. H. Knowlton;* pebbly shore, Brattleboro, 1894, *Grout.* MASSACHUSETTS: Sudbury, July 19, 1886, *W. Deane;* bank of Neponset River between upper and lower falls, Milton, August 29, 1853, *Wm. Boott;* roadside, Wellesley, July 11, 1896, *Hunnewell;* Middleboro, August 11, 1901, *J. Murdoch, jr.;* edge of thicket, Northampton, July 23, 1932, *Hunnewell*, no. 12,496; bank of Connecticut River, Springfield, July 13, 1914, *Luman Andrews.* CONNECTICUT: bank of Connecticut River, East Windsor, July 13, 1902, *Bissell;* South Meadow, Hartford, July 7, 1908, *H. S. Clark.* NEW YORK: shores of Black Lake, Morristown, August 15, 1914, *Phelps*, no. 814; Mohawk flats east of Utica, July 18, 1900, *Haberer*, no. 709; Sylvan Beach, Oneida County, July 13, 1916, *House;* bank of Hudson River, near Cedar Hill, south of Albany, July 17, 1910, *Burnham;* wet gravelly soil, Ulysses, July 1, 1913, *E. L. Palmer*, no. 1039; moist thicket near Cold Spring, Alleghany State Park, July 30, 1926, *Alexander & House*, no. 12,783. NEW JERSEY: marsh, Rosenkraus Ferry, Delaware River, Sussex County, July 4, 1918, *E. B. Bartram;* wet ground, Kaign's Point, Camden, June 21, 1922, *Meredith;* border of tidal marsh along Delaware River, north of Penns Grove, August 9, 1935, *Fogg*, no. 9309. PENNSYLVANIA: Sellersville, July 18, 1923, *Fretz;* Greene County, July 2, 1923, *S. S. Dickey;* Presque Isle, June 29, 1922, *Dickey.* VIRGINIA: swampy woods near Nottoway River at Readjuster Bridge, south of

Peanut, Sussex County, June 18, 1941, *Fernald & Long*, no. 13,129; along branch, south of Meherrin River, south of Western Bridge, Brunswick County, *J. B. Lewis*, nos. 2800 and 3538. South Carolina: Woodstock, 1833, *Gibbes* in Herb. N. Y. Bot. Gard. Ontario: Ottawa, August 8, 1894, *J. Macoun*, no. 5852; Wingham, July 24, 1894, *J. A. Morton;* Chippewa, July 5, 1858, *Wm. Boott.* Michigan: near river, Flint, July 21, 1909, *Sherff;* Agricultural College, July 25, 1896, *C. F. Wheeler.* Ohio: Troy, Geauga County, July 21, 1904, *R. J. Webb*, no. 716; Sandusky, August 1, 1894, *Moseley;* Rocky River, near Cleveland, July 13, 1896, *Greenman*, no. 1403; Painesville, July 19, 1885, *Werner*, no. 342; Sugar Grove, Fairfield County, August 6, 1892, *Werner*, no. 343; near Cincinnati, July 9, 1888, *C. G. Lloyd.* Wisconsin: Fort Wing, July 10, 1897, *L. S. Cheney*, no. 7166. Illinois: Stony Island, Cook County, June 30, 1914, *H. H. Smith*, no. 5974; damp woods, Peoria, July, 1903, *F. E. McDonald;* banks of Mississippi, near Oquawka, July 18, 1872, *Patterson.* Minnesota: Lake City, August 13, 1883, *W. H. Manning.* Map 3.

Var. **hispida** (Pursh), comb. nov. *S. hispida* Pursh, Fl. Am. Sept. ii. 407 (1814). *P. tenuifolia*, var. *aspera* sensu Fernald in Rhodora, x. 85 (1908), not *S. aspera* Michx., basonym. *S. ambigua* sensu Robinson & Fernald in Gray, Man. ed. 7: 701 (1908), not *S. ambigua* (Gray) Britton.—Meadows, swamps, low woods and shores, southern New Hampshire, eastern Massachusetts and Rhode Island, eastern New York, south to eastern South Carolina; Michigan, Wisconsin, Indiana and Illinois. The following selected from a large series, are typical. Massachusetts: tidal bank of Merrimac River, Newburyport, *Donald White*, no. 501; near Concord River, Lowell, July 14, 1880, *C. W. Swan;* riverbank, Concord, July 17, 1886, *Deane;* Prince's Pond, Needham, August 2, 1884, *T. O. Fuller;* Neponset River, Hyde Park, July 10, 1904, *A. W. Cheever;* Pine Tree Brook, Milton, July 13, 1911, *Churchill;* Dedham, July 18, 1891, *Churchill;* wet meadows, Dover, *St. John*, no. 594; open bog, Sharon, July 12, 1896, *E. F. Williams;* sandy pond-shore, Walpole, *Hunnewell*, no. 6779; Middleboro, *Richard Murdoch*, no. 933; Taunton, *F. C. Seymour*, no. 4187. Rhode Island: Providence, July, 1844, *Thurber;* Bristol, *F. S. Collins*, no. 2358; grassy bank near salt marsh, Portsmouth, July 11, 1909, *Sanford.* New York: various specimens from eastern counties intermediate between this and the preceding variety, none fully characteristic. New Jersey: along streamlet 1 mile northeast of Delanco, Burlington County, *Long*, no. 6354; fresh marshes along Wading River, New Gretna, Burlington County, *Long*, no. 10,574; rich bog along railroad, Cold Spring, Cape May County, August 29, 1922, *Fogg.* Pennsylvania: Tinicum, Delaware County, August, 1873, *Chas. Schaeffer;* meadow near Red Clay Creek,

Kennett Square, Chester County, June 28, 1924, *Mary A. Williams*. Maryland: King's Creek, *J. A. Holmes*, no. 98. Virginia: wet argillaceous thickets and ditches, Rosemont, Princess Anne County, *Fernald & Long*, no. 5017; fresh reed-marsh and swale along Northwest River near Northwest, Norfolk County, *F. & L.*, no. 14,005; alluvial woods, along Nottoway River at Readjuster Bridge, south of Peanut, Sussex County, *F. & L.*, no. 12,459; bushy swales and borders of swampy woods near Blackwater River, Cobb's Wharf, Southampton County, *F. & L.*, no. 10,407 (transition to typical *S. tenuifolia*); alluvial woods by Fontaine Creek, west of Dahlia, Greensville County, *F. & L.*, no. 14,399; peaty and argillaceous clearing about 4 miles southeast of Emporia, *F. & L.*, nos. 8445 and 8834; bottom-land woods along Meherrin River northeast of Gaskins, Greensville County, *F. & L.*, no. 13,434. South Carolina: wet ditch, thicket, 13 miles east of Walterboro, Colleton County, *Wiegand & Manning*, no. 2793; border of swamp, 12 miles north of Georgetown, *Godfrey & Tryon*, no. 1067. Michigan: near river, New Buffalo, *Lansing*, no. 3262. Indiana: low place in woods, about 1 mile southeast of Woodland, St. Joseph County, *Deam*, no. 50,459; damp prairie, Roby, *Lansing*, no. 2542; Frankfort, June 27, 1886, *H. A. Young*. Wisconsin: St. Croix Falls, July 8, 1900, *C. F. Baker*. Illinois: open field, South Chicago, *H. H. Smith*, no: 5684. Plate 790 and map 4. See p. 369.

Stachys hispida Pursh, typified by Epling by a Clayton specimen from Virginia (presumably in the eastern section), is, according to the description and as indicated by Epling's note on a sheet in the Gray Herbarium, this narrow-leaved extreme. Var. *hispida* has, so far as material before me shows, the broken range of many Coastal Plain types, great concentration in eastern Massachusetts and adjacent Rhode Island, absence from Connecticut and much, if not all, of New York, reappearance farther south, and with an area centering on Lake Michigan and running into Wisconsin. In Massachusetts, New Jersey, eastern Pennsylvania and eastern Virginia it tends to grow in more acid habitats than var. *platyphylla*, the latter preferring the sweeter and richer soils, as does typical *S. tenuifolia*.

The confusion of *Stachys hispida* with *S. aspera* Michaux arose through unfamiliarity with the latter. A photograph of the Michaux type now before me shows it to be, as identified by Epling, the southern plant which Gray (1878) described from Georgia, Kentucky and Illinois as *S. hyssopifolia* Michx., var.

ambigua. It was soon called *S. ambigua* (Gray) Britton (1894) but, on account of the earlier European *S. ambigua* Sm. (1810), the name was changed to *S. Grayana* House (1921). *S. aspera*, described from "*in campestribus* Carolinae", is a plant of sands and prairies from northern Florida to eastern Missouri, north to southern New Jersey, southeastern Pennsylvania, Kentucky, Illinois and Iowa; also adventive as a field-weed in Somerset County, Maine. It is, as Gray considered it, very close to *S. hyssopifolia* Michx., having the firm and scarcely veiny leaves almost of the latter but mostly broader, their lowest lateral nerves prolonged very close to the margin of the blade. From glabrous *S. hyssopifolia* it is distinguished only by the stems more or less retrorse-hispid on the angles, leaves sometimes broader and more regularly depressed-serrate, upper bracts often broadly-lanceolate to ovate (instead of linear or narrowly lanceolate), calyx often minutely pilose (instead of quite glabrous) and frequently setose on the angles. Gray's disposition of it, as *S. hyssopifolia*, var. *ambigua*, seems wholly justified. In the Carolinas and northeastward there are altogether too many transitions to support its separation as a species.

In his *Revision* Epling, l. c. 65, 66, including with the narrow-leaved *S. tenuifolia*, var. *hispida*, as above defined (PLATE 790), the generally more inland var. *platyphylla* (PLATE 789) as a species, *S. hispida*, was "inclined to believe *S. hispida* to have been derived from *S. ambigua*, probably after intermixture with *S. hyssopifolia*". He identified as *S. ambigua* Sm. Engl. Bot. xxx. pl. 2089 (1810) the very pilose and narrow-leaved extreme of *S. palustris* L. which I had described as *S. palustris*, var. *homotricha* Fernald in RHODORA, x. 85 (1918), which he also identified with the similarly long-pilose *S. velutina* Schwein. (1824), not Willd. (1813) and *S. arenicola* Britton (1901). Just why *S. ambigua* sensu Epling (PLATE 793) is identified with *S. ambigua* Sm., the European plant (PLATE 791), is not clear. He was advised of the error but did not wholly admit it, saying, p. 65, "Since the above was written I have had the privilege of discussing this form with Prof. G ö t e T u r e s s o n who is of the opinion that I have mis-interpreted the European hybrid *S. ambigua*. This, according to him is a rare and sterile plant. Until I can review the whole matter I am accordingly at as [a]

loss. Suffice it to say that the form here described as *S. ambigua* is scarcely to be distinguished from plants commonly referred to that species of European botanists".

Now, *Stachys palustris*, var. *homotricha* (PLATE 793), i. e. *S. ambigua* sensu Epling, is a stiff and normally simple-stemmed plant with the sides and angles of the stem and the rachis densely and retrorsely long-pilose or villous (FIGS. 2 and 3), the lanceolate to lance-linear leaves sessile and heavily pubescent beneath (FIG. 2), the calyx long-hirsute (FIGS. 2–5), the outside of the corolla strongly pilose. It occurs from Maine and southern Quebec to Wisconsin, south to Connecticut, southern New York, Ohio and Illinois (MAP 5). *S. ambigua* Sm., on the other hand, is a generally recognized sterile hybrid of typical European *S. palustris* (the latter only naturalized in Newfoundland, eastern Canada, New England and New York) and the endemic European *S. sylvatica* L., a plant with long-petioled cordate-ovate leaves. As shown by Smith's original plate and description and by many European specimens (our PLATE 791) it is a tall and loosely branched plant with the stem (FIG. 2) minutely strigose-pilose, the principal leaves definitely petioled, the divergent oblong-ovate blades minutely pilose beneath, the calyx short-pilose (FIG. 3) and the corolla only finely pilose. If it is inseparable from the indigenous North American *S. palustris*, var. *homotricha* (PLATE 793), it is time to give up.

As to Epling's belief that *Stachys hispida* in his sense, *i. e.* both *S. tenuifolia* var. *platyphylla* (PLATE 789 and MAP 3) and var. *hispida* (PLATE 790 and MAP 4), was derived from his "*S. ambigua*" (taking it for the American plant cited by him, our PLATE 793, and *S. hyssopifolia* Michx. (PLATE 788, FIGS. 3–5 and MAP 6) one may be pardoned a gasp of surprise. *S. palustris*, var. *homotricha* (*S. ambigua* sensu Epling) is shown in PLATE 793, *S. tenuifolia*, vars. *hispida* and *platyphylla* (*S. hispida*, inclusive, of Epling) in PLATES 790 and 789. Together the latter have a wide continental dispersal (MAPS 3 and 4), while *S. palustris*, var. *homotricha* is northern and within the northern range of the former. *S. hyssopifolia* (PLATE 788, FIGS. 3–5), is primarily a plant of the Atlantic Coastal Plain, but with the typical isolation at the head of Lake Michigan (MAP 6). It is strictly glabrous, with linear to narrowly oblong blunt to subacute, firm, pale,

entire leaves, so firm that, when fresh, only the midrib shows beneath, but, by transmitted light its leaves show the lower lateral veins following forward within 0.3–1 mm. from the margin, and its subglobose nutlets (FIG. 5) are only 1.5–1.8 mm. long. *S. hispida* and *S. ambigua* sensu Epling are both pubescent. Their leaves are from narrowly lanceolate to oblong-ovate and usually pubescent, veiny, with the lower pair of laterals following forward from 3–10 mm. within the copiously toothed margin, and their tips are acuminate; the nutlets (PLATE 792, FIG. 4) of *S. palustris* are ellipsoid-obovoid and 1.8–2.2 mm. long, those of *S. tenuifolia*, including *S. hispida*, similar and 2.1–2.7 mm. long (PLATE 788, FIG. 5). Just how, by crossing the narrow-, blunt- and firm-leaved, chiefly Coastal Plain *S. hyssopifolia* (PLATE 788, FIGS. 3–5) with the narrow-leaved continental and northern and by Epling misidentified *S. "ambigua"* (PLATE 793), with leaves 1–3 cm. wide, one gets the wide-ranging *S. hispida* sensu Epling (PLATES 789 and 790), with no trace of the pubescence of *S. "ambigua"* on stem, leaves and calyx and with leaves up to 6 cm. broad, is beyond my understanding. Is this modern phylogeny?

OUR VARIETIES OF STACHYS PALUSTRIS (PLATE 792–794)—During this study of *Stachys* it has been necessary to unravel our variations of *S. palustris*. This is a northern, circumboreal species with two pronounced subspecies, each with several geographic varieties. Typical Eurasian *S. palustris* L. has the calyx (PLATE 792, FIG. 3) closely viscid-pilose with many gland-tipped hairs mixed with short glandless ones, the latter rarely more than 1 mm. long. It and three of the varieties recognized in Europe are naturalized about towns and settlements, often about ports, in various parts of Newfoundland, Quebec, eastern Ontario, the Maritime Provinces, New England and New York. The native North American plants differ in having the calyx long-hirsute as well as short-pilose, the shorter pubescence largely hidden by long whitish and glandless setiform trichomes mostly 1.5–3 mm. long. This is subsp. *pilosa* (Nutt.) Epling, based on *S. pilosa* Nutt. in Journ. Acad. Phil. vii. 48 (1834). The native subsp. *pilosa* consists, in the Gray's Manual range, of five rather well defined varieties. These I am distinguishing as follows.

a. Leaves sessile or on very short and inconspicuous thick petioles....*b.*
b. Principal leaves oblong to oblong-ovate or oval, blunt or merely subacute, three tenths to one half as broad as long, 3.5–12 cm. long, 1.5–5 cm. broad; chiefly western...Var. *pilosa.*
b. Principal leaves narrowly to broadly lanceolate or narrowly oblong, acuminate, one seventh to one third as broad as long, 2–13 cm. long, 0.4–3 cm. broad; chiefly eastern and northern....*c.*
c. Pubescence of sides of stem many times shorter than that of angles, or minute and with long hairs of angles wanting.
Angles of stem retrorsely long-hirsute, sides short-pilose; leaves lanceolate to oblong, the principal ones 4–13 cm. long and 0.8–3 cm. broad, strongly hispid on the veins and pilose on the surfaces beneath; boreal and transcontinental.....Var. *nipigonensis.*
Angles of stem with few or no long hairs, sides minutely and retrorsely appressed-pilose-puberulent; leaves narrowly lanceolate, the principal ones 2–5.5 cm. long and 0.4–1.5 cm. broad, sparsely and minutely puberulent to glabrous beneath; plant of Upper Great Lakes region.....Var. *macrocalyx.*
c. Pubescence of sides of stem very dense and long, as long as and not readily distinguished from that of the angles.....Var. *homotricha.*
a. Leaves slender-petioled, the petioles of the principal ones 1–1.4 cm. long, the oblong or lance-ovate acuminate blades mostly 6–12 cm. long and 2–4 cm. broad; angles of stem with relatively few or no long hairs.....Var. *phanero poda*

S. PALUSTRIS L., var. **pilosa** (Nutt.), stat. nov. *S. pilosa* Nutt. in Journ. Acad. Phil. vii. 48 (1834). Subsp. *pilosa* (Nutt.) Epling in Fedde, Repert. Beih. lxxx. 63 (1934). *S. scopulorum* Greene, Pittonia, iii. 342 (1901).—Shores, stream-margins, meadows, etc., British Colombia to Arizona, east to Ontario, Wisconsin, Illinois, Nebraska, and adventive along railroads and in waste places eastward to New England (several collections from near stations along the Canadian Pacific and Grand Trunk Railroads).

Var. NIPIGONENSIS Jennings in Journ. Wash. Acad. Sci. x. 459 (1920).—Low grounds, Quebec to Alaska, south to western New England, New York, Ohio, Michigan, Illinois, Iowa, New Mexico and Arizona.

Var. MACROCALYX Jennings, l. c. 458 (1920).—Shores, Thunder Bay District, Ontario, to northern Wisconsin and northern Minnesota.

Var. HOMOTRICHA Fernald in RHODORA, x. 85 (1908). *S. velutina* Schweinitz in Long's Exped. Winnip. ii. 390 (1824), not Willd. (1813). *S. arenicola* Britt. Man. 792 (1901). *S. palustris*, var. *arenicola* (Britt.) Farw. in Am. Midl. Nat. xl. 82 (1928). *S. Schweinitzii* Rydb. in Brittonia, i. 95 (1931). *S. homotricha* (Fern.) Rydb. l. c. (1931). *S. pustulosa* Rydb. l. c. (1931).—

Shores, meadows and fields, Maine and southern Quebec to Wisconsin, south to Connecticut, New York, Ohio and Illinois. PLATE 793, MAP 5.

Var. **phaneropoda,** var. nov., Weatherby in herb. (TAB. 794) foliis petiolatis, petiolis (foliorum principalium) 1–1.4 cm. longis, laminis oblongis vel lanceolato-ovatis 6–12 cm. longis, 2–4 cm. latis; setis in angulis caulis ex comparatione paucis vel carentibus. OHIO: Port Clinton, Ottawa County, July 31, 1894, *Moseley*. WISCONSIN: Spooner, July 20, 1911, *J. J. Davis*. IOWA: riverbank, Estherville, July 31, 1925, *B. O. Wolden*, no. 1118, TYPE, in Herb. Gray.

PLATE 787. STACHYS TENUIFOLIA Willd.: FIG. 1, plant, × ½, from Cypress Bridge, Nottoway River, Southampton County, Virginia, *Fernald & Long*, no. 6370; FIG. 2, surface of stem, showing lack of pilosity, × 10, FIG. 3, lower surface of leaf, × 10, and FIG. 4, bracts and flower, × 4, all from James River at Harrison Point, Charles City County, Virginia, *Fernald & Long*, no. 9133.

PLATE 788, FIGS. 1 and 2, S. TENUIFOLIA, VAR. PERLONGA Fernald: FIG. 1, ISOTYPE, × ⅖; FIG. 2, bracts and calices, × 4. FIGS. 3–5, S. HYSSOPIFOLIA Michx.: FIG. 3, plant, × ½, from southeast of Yorktown, Virginia, *Fernald & Long*, no. 8835; FIG. 4, bract and mature calyx, × 4, from south of Yorktown, *Fernald, Long & Fogg*, no. 5016; FIG. 5, nutlet, × 10, from Sandwich, Massachusetts, October 23, 1922, *Fernald*.

PLATE 789. S. TENUIFOLIA, VAR. PLATYPHYLLA Fernald: FIG. 1, TYPE, × ⅖; FIG. 2, surface of stem, the pustular-based hairs of the angles bent by pressing, × 10, from Alburg, Vermont, July 16, 1939, *C. H. Knowlton;* FIG. 3, lower surface of leaf, × 10, and FIG. 4, rachis, bracts and calices, × 4, from same place as FIG. 2; FIG. 5, nutlet, × 10, from Chaumont, New York, *Fernald, Wiegand & Eames*, no. 14,429.

PLATE 790. S. TENUIFOLIA, VAR. HISPIDA (Pursh) Fernald: FIG. 1, plant, × ½, from Rosemont, Princess Anne County, Virginia, *Fernald & Long*, no. 5017; FIG. 2, portion of stem, with nearly glabrous sides but strongly hirsute angles, × 10, FIG. 3, lower surface of leaf, × 10, and FIG. 4, rachis, bracts and calices, × 4, from Sharon, Massachusetts, July 12, 1896, such plants from Sharon specially noted in Gray Herb., by Epling, as like Pursh's type.

PLATE 791. S. AMBIGUA Sm.: FIG. 1, summit of plant, × ½, from Borgholm, Öland, Sweden, July 20, 1886, *Areskug;* FIG. 2, portion of stem, × 10, from same plant; FIG. 3, calices, × 4, from Austria, *Bot. Tauschver. Wien.*

PLATE 792. S. PALUSTRIS L.: FIG. 1, portion of stem, × 10, from Bouillon, Belgium, August 10, 1933, ex *Herb. Hort. Brux.;* FIG. 2, lower surface of leaf, × 10, and FIG. 3, two whorls of flowers, × 4, from same collection; FIG. 4, nutlet, × 10, from ballast-filling, York, Gaspé County, Quebec, *Collins, Fernald & Pease* (*Pease*, no. 5062½).

PLATE 793. S. PALUSTRIS, VAR. HOMOTRICHA Fernald (*S. ambigua* sensu Epling, not Sm.): FIG. 1, plant of TYPE, × ⅜; FIG. 2, lower bracts and calyx, × 4, from TYPE; FIG. 3, stem and lower surface of leaf-base, × 10, from TYPE; FIG. 4, narrow-leaved extreme (*S. arenicola* Britton), × ½, from Copper Harbor, Michigan, *Farwell*, no. 281); FIG. 5, two calices, × 4, from no. 281.

PLATE 794. S. PALUSTRIS, VAR. PHANEROPODA Weatherby: FIG. 1, TYPE, × ½; FIG. 2, stem, × 4; FIG. 3, calyx, × 10.

PYCNANTHEMUM VERTICILLATUM (Michx.) Pers. A second Coastal Plain station, this in NORFOLK COUNTY: damp old clearings and thickets, eastern side of Great Dismal Swamp, north of Wallaceton, nos. 13,736 and 14,007.

P. PYCNANTHEMOIDES (Leavenw.) Fern., var. VIRIDIFOLIUM Fern. A second Coastal Plain station, this in SOUTHAMPTON COUNTY: border of dry woods northeast of Adams Grove, no. 14,398.

VERBENA OFFICINALIS L. To the relatively few stations add one in SOUTHAMPTON COUNTY: roadside bordering Womble's (Wade's) Millpond, north of Baffle, no. 14,395.

PHYSALIS MONTICOLA C. Mohr. Range extended northeastward to ISLE OF WIGHT COUNTY: sandy wooded slope by Blackwater River, west of Blackwater School, no. 14,400, unusually large, up to 3.5 dm. high. See p. 370.

*LINARIA CANADENSIS (L.) Dumort., forma **albina,** f. nov., corollis albidis.—VIRGINIA: burned spot, white sand of dry pine barrens, south of Lee's Mill, Isle of Wight County, April 21, 1942, *Fernald, Long & Abbe,* no. 14,230 (TYPE in Herb. Gray.).

GRATIOLA VIRGINIANA L., var. AESTUARIORUM Pennell. Range extended inland to BRUNSWICK COUNTY: open mud by Triplett Pond, Seward Forest, near Triplett, *Fernald & Lewis,* no. 14,497. See p. 380.

UTRICULARIA PURPUREA Walt. Local range extended inland to SUSSEX COUNTY: Harold's (or Harris) Millpond, southeast of Waverly, no. 14,408. See p. 371.

U. INFLATA Walt. Local range extended inland to SUSSEX COUNTY: back-water pool by Nottoway River at Readjuster Bridge, south of Peanut, *Fernald, Long & Abbe,* no. 14,231.

U. INFLATA, var. MINOR Chapm. To the very few recorded stations add the following. SOUTHAMPTON COUNTY: quiet pool in cypress swamp bordering Womble's (Wade's) Millpond, north of Baffle, no. 14,406. SUSSEX COUNTY: Harold's (or Harris) Millpond, southeast of Waverly, no. 14,407. See pp. 371 and 372.

U. VIRGATULA Barnhart. To the few recorded stations add one in SOUTHAMPTON COUNTY: on a decaying log in mossy margin of *Cephalanthus*-pool near Johnson's Millpond, north of Sedley, no. 14,411. See p. 371.

OLDENLANDIA BOSCII (DC.) Chapm. To the only two recorded Virginia stations, in southern Southampton County, add the following. SUSSEX COUNTY: sandy-muddy shore, Brittle's Millpond, west of Wakefield, no. 14,417; sandy beach, Airfield Millpond, southwest of Wakefield, no. 14,419. SOUTHAMPTON COUNTY: sandy shore of Johnson's Millpond, 1½ miles north of Sedley, no. 14,416. ISLE OF WIGHT COUNTY: muddy and swaley shore of Darden's Pond, southeast of Collosse, no. 14,418. See pp. 371 and 372.

*LOBELIA SIPHILITICA L., forma **laevicalyx,** f. nov., foliis glabris; caulibus vix pubescentibus; calycibus corollisque glabris.—Isle of Wight County, VIRGINIA: seeping argillaceous and calcareous bluffs along Burwell's Bay, James River, below Rush-

mere (Fergusson's Wharf), August 27 and 29, 1940, *Fernald & Long*, no. 12,834, October 10, 1941, *Fernald & Long*, no. 14,030 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.).

My attention was directed to this extremely smooth form by Dr. Wray M. Bowden of the Central Experimental Farm at Ottawa, Ontario. I had supplied Dr. Bowden with seeds from no. 14,030 and from some other species in the autumn of 1941. On October 14, 1942, I received from him a letter from which the following passages are extracted:

"Just a note to ask if you could examine your specimen of *Lobelia siphilitica* L., *Fernald and Long*, no. 14,030 . . . You sent seed from this last year and the plants have grown well. The row was quite uniform but not at all like any of the numerous collections of *L. siphilitica* which I have. The stems and leaves are glabrous. The upper leafy bracts in the flower-spike are much longer and pointed, and the calyx is not nearly as pubescent—in fact only the free ends of the lobes are pubescent. The row was quite uniform both in respect to these characters and to colour of corolla which was light blue. . . The corolla is quite glabrous also."

The original specimens have the leaves, calyx and corolla quite glabrous, but the stem is remotely hispid. Other collections from calcareous bluffs of the James are more pubescent. The plant below Rushmere seems to me best treated as a forma, typical *L. siphilitica* having the stem and one or both faces of the leaves variously pubescent, the calyx always more or less so and the tips of the corolla-lobes bearded. Among these more typical plants I find some with quite as prolonged bract-tips as in the Rushmere plant.

L. GLANDULIFERA (Gray) Small. Local range extended into Brunswick County: sphagnous thicket, "Ram Hole Swamp", Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,500. See p. 377.

*EUPATORIUM ROTUNDIFOLIUM L., var. **cordigerum,** var. nov., planta robusta ad 1.3 m. alta caule densissime albido-piloso-tomentuloso; foliis mediis late ovatis subacutis sessilibus valde cordatis 5–8.5 cm. longis 4–7 cm. latis subaequaliter dentatis subtus dense pilosis.—VIRGINIA: upper border of fresh reed-marsh and swale along Northwest River near Northwest, Norfolk County, June 30, 1942, *Fernald & Long*, no. 14,426 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); mossy thicket by *Cephalanthus*-pool near Johnson's Millpond, north of Sedley, Southampton County, July 4, 1942, *Fernald & Long*, no. 14,427, October 14, 1942, *Fernald*, no. 14,502. NORTH CAROLINA: roadside near Windsor, Bertie County, October 15, 1938, *Godfrey*, no. 7007. See pp. 369 and 371.

Var. *cordigerum* is a very extreme variation in the polymorphic *Eupatorium rotundifolium*. In size of plant and of foliage it suggests the wide-ranging var. *ovatum* (Bigel.) Torr. (*E. pubescens* Muhl.) but its dense pubescence is more like that of typical small-leaved *E. rotundifolium*. In its strongly cordate, instead of gradually rounded, leaf-bases it is very striking, the cordate bases of the middle and upper leaves reaching nearly around the stem.

Liatris graminifolia Willd., var. Smallii (Britt.) Fern. & Grisc. Local range extended into Sussex County: damp sandy pine and oak woods south of Stony Creek, no. 11,455.

Boltonia caroliniana (Walt.) Fern. Range extended inland to Brunswick County: bottomland woods above Western Bridge, Meherrin River, south of Edgerton, *Fernald & Lewis*, no. 14,512, rays pink. See p. 379.

*Erigeron strigosus Muhl., forma discoideus (Robbins) Fern. Nansemond County: open ground along highway, northern border of Great Dismal Swamp, east of Magnolia, no. 14,436.

*Solidago salicina Ell. Brunswick County: open bog near Seward Forest Headquarters, September 14, 1940, *J. B. Lewis;* boggy thicket, "Ramhole" Swamp, Seward Forest, Triplett, *Fernald & Lewis*, no. 14,506.—Extension northward from Wake County, North Carolina; most specimens (from North and South Carolina and west to Texas) previously confused with the northern and upland calcicolous *S. patula*. See p. 377.

S. salicina is a very definite southern species of acid bogs of the inner Coastal Plain and outer Piedmont, at once distinguished from *S. patula* by its narrower and more crenate leaves, the cauline ones 20–45 (in *S. patula* 12–23) and rapidly reduced in size, the more open panicle with more elongate and glabrescent branches floriferous at tip, the long-pedicelled heads borne strictly along the upper sides of the branches (in *S. patula* the shorter-pedicelled heads tending to be in short racemes subspirally borne along the white-pilose panicle-branches).

Gnaphalium spathulatum a later Homonym (Plate 795, the type, × 2/5).—It seems to have been overlooked that *Gnaphalium spathulatum* Lam. Encycl. ii. 758 (1786) is antedated by *G. spatulatum* Burm. f. Fl. Cap. Prodr. 25 (1768) which was the binomial based directly on the well described *Elychrysum foliis oblongis circa caulem auritis & tomentosis* of Breyn, Prodr. 29, t.

xviii. fig. 3 (1739), this being referred by Index Kewensis to *Helichrysum crispum* D. Don, not *H. spatulatum* Moench. The plant which generally passes as *Gnaphalium spathulatum* cannot, therefore, maintain that name. The exact identity of Lamarck's type is yet to be worked out. The habit-photograph of it before me is good as such, but until the technical characters can be closely studied it would be unsafe to base a new name upon it. The group of annuals and biennials to which it belongs is most complex, a series of ruderal and campestrian plants of tropical and warm-temperate regions of which the characters reside in habit, shape and indument of leaves, indument of stem, indument of involucre, shape of phyllaries, etc. The plant usually passing as *G. spathulatum* is wide-spread in South America, and in North America from Florida to Texas, north to southeastern Pennsylvania and southern California. Superficially it strongly resembles *G. platense* Cabrera, Compuestas Bonaerenses, 167, fig. 45 (1941), but that species, as clearly illustrated by Cabrera, has the leaves and stems copiously glandular, the elongate pluricellular glands of the stem divergent, and the inner phyllaries slender-tipped. Cabrera refers *G. spathulatum* Lam. to *G. americanum* Willd., but certainly the plant of our southern states is not the West Indian *G. americanum*, which is very near *G. purpureum* L. Until the whole complex group can be most thoroughly studied, with intimate knowledge of the actual types and their technical characters, it would be quite unwise to rename the poorly understood *G. spathulatum* Lam. (originally a garden-plant). I am, therefore, at the risk of publishing a name which eventually may have to be discarded, proposing a new name based upon an unequivocal type.

Gnaphalium (§ Gamochaeta) **peregrinum,** sp. nov. (tab. 795), bienne vel annuum; caulibus subsimplicibus vel plerumque ramosis 1–6 dm. altis griseo-lanatis; foliis caulinis anguste spathulato-obovatis vel late oblanceolatis apice rotundatis, imis 2–7 cm. longis 0.8–2.5 cm. latis, subtus villoso-lanatis supra deinde viridescentibus; capitulis stramineis glomerulatis glomerulis subdistantibus spicam interruptam 1–2 cm. crassam formantibus; involucris 3–4 mm. altis basi valde lanatis; phyllariis interioribus oblongis vel spathulatis obtusis.—Roadsides, fallow fields and waste places, Florida to Texas and southern California, north, locally, to southeastern Pennsylvania; eastern South

America. TYPE: in burnt-over pine-scrub oak sandhills, north edge of Pineville, Rapides Parish, Louisiana, July 30, 1938, *D. S. & H. B. Correll*, no. 9937 (in Herb. Gray.).

G. OBTUSIFOLIUM L., var. HELLERI (Britt.) Blake. To the stations much farther east add one in BRUNSWICK COUNTY: sandy pine woods, Seward Forest, near Triplett, *Fernald & Lewis*, no. 14,514. See p. 380.

G. OBTUSIFOLIUM, VAR. MICRADENIUM Weath. Range extended inland to BRUNSWICK COUNTY: dry woods near Rattlesnake Creek, west of Triplett, *Fernald & Lewis*, no. 14,513. See p. 380.

(To be continued)

VIRGINIAN BOTANIZING UNDER RESTRICTIONS

M. L. Fernald

(*Continued from page 480*)

Some Varieties and Species of Helenium (Plates 796–799).—As a genus *Helenium*, in its present sense, was first called *Helenia* L. Hort. Cliff. 418 (1737). It consisted of a single species, *Helenia foliis decurrentibus*, based in part on the plant of Clifford's garden (our PLATE 797, FIG. 1), in part upon many references to previously described plants of European gardens called *Heleniastrum*, *Chrysanthemum* or *Aster*, the latter not actually before Linnaeus. When the genus was taken up at the nomenclaturally critical date, 1753, and assigned a binomial it was as *Helenium autumnale* L. Sp. Pl. ii. 886 (1753). The citations then given by Linnaeus indicate the two plants somewhat generally found at that time in European gardens, and, although in N. Am. Fl. xxxvi². 127 (1915) Rydberg says that the type came from Canada, Linnaeus himself in 1753 was not so explicit, he then saying "*Habitat in* America *septentrionali*". In Hortus Cliffortianus he had said "*in* Florida & Canada".

The plant of Clifford's garden (our PLATE 797, FIG. 1) had narrowly lanceolate and long-acuminate, nearly entire leaves, few long-peduncled heads, the mature disk 1.8+ cm. broad, the narrow ligules strongly narrowed at base, 2 cm. long and only 2.5–3.3 mm. broad at the sharply trifid apex. Except that its

leaves are rather more spreading and its branching looser, it closely matches the plant of tidal shores of the St. Lawrence (FIG. 2), there found from near Montreal to below Quebec, and extending westward through much of the St. Lawrence basin and far to the southwest. Rydberg's inference was correct, apparently, that this plant originated in Canada. The second plant cultivated in Europe was the extreme which Linnaeus preserved in his own herbarium (presumably from the Upsala garden) and which, according to the late Dr. B. Daydon Jackson, was before him in preparing Species Plantarum, ed. 1. This (our PLATE 796, FIG. 1) is the coarser plant of our Northeast, with more elliptic and broader, toothed leaves, and large heads, with the mature disk of the leading head nearly 2.2 cm. broad, the flat and cuneate ligules 2.2–2.3 cm. long and 8.3–11.7 mm. broad at the bluntly lobed summit. Just such a plant (FIG. 2), with ligules up to 2.5 cm. long, occurs from western New England to Minnesota, south to New Jersey, upland to western North Carolina, Kentucky and Missouri. *Helenium autumnale* of 1753 consisted of both extremes and there is logic in interpreting either of them as the type. In a nomenclature beginning with 1753 (not 1737 and earlier), however, the plant in the Linnean Herbarium, the specimen Linnaeus definitely had before him in preparing Species Plantarum, is here selected. It is the extreme of the species which most students of the past have treated as *H. autumnale*, as will later be noted.

Both of them being in European gardens, whence they were described by Ventenat in 1720, Miller, with no reference to Linnaeus, took his cues directly from Ventenat, not from the Linnean Herbarium. Miller called *Helenium autumnale* the narrow-leaved extreme, the "*Bastard Sun-flower with a longer and narrower leaf*," the *Heleniastrum folio longiore & angustiore* of Ventenat; and the plant with broader leaves and larger heads, the *Heleniastrum folio breviore & latiore* of Ventenat, Miller called *Helenium latifolium* Mill. Gard. Dict. ed. 8 (1768), the "*Bastard Sun-flower with a broader and shorter leaf*". Among botanists of the period, however, Miller was essentially alone in his interpretation. Lamarck, Smith, Schkuhr and other botanists, far more precise than the very impressionistic Miller, took the broad-leaved and large-headed plant (our PLATE 796) of the Linnean Herbarium as

true *H. autumnale*. Thus Lamarck described as a new species, *H. canaliculatum* Lam. in Journ. d'Hist. Nat. ii. 213, t. 35 (1793) the narrow-leaved plant of European gardens which Ventenat had called *Heleniastrum folio longiore & angustiore* and which Miller took up as *H. autumnale*. Lamarck's description and life-sized illustration (our PLATE 797, FIG. 3) indicated unbranched plants with solitary large heads with ligules 1.6 cm. long and only 3–5 mm. broad at the sharply toothed summit: "Semi-flosculi 15–18, foeminei, distincti, patentes: ligulis concavo-canaliculatis, apice tridentatis". Lamarck went on "L'*Helenie canaliculée* diffère évidemment de l'*Helenie* d'automne (dict. vol. 3, pl. 81) . . . par son aspect, son port, et principalement par le caractère de ses demi-fleurons, qui ne sont point élargis, planes, et réfléchis comme dans ces [referring to both *H. autumnale* and *H. quadridentatum*] espèces"; and in summary he contrasted his *H. canaliculatum* "*semi-flosculis canaliculatis*" and *H. autumnale* "*semi-flosculis planis reflexis*". Somewhat later Lamarck, Ill. iv. t. 688, fig. 1 (1797), illustrated his conception of *H. autumnale*, the plant of the Linnean Herbarium.

Helenium canaliculatum Lam. (portion of his illustration, shown in our PLATE 797, FIG. 3) was unquestionably the same as the plant (our PLATE 797, FIG. 1) of the Clifford garden. Except for the more spreading leaves, a natural response to the ameliorations of cultivation, *H. canaliculatum* is the extreme (FIG. 2) of *H. autumnale* which characterizes the tidal shores of the St. Lawrence from above Montreal to below Quebec, thence westward to Minnesota and Iowa. That region was the source of many plants early carried to Europe and a very inexact and obviously conventionalized plate of it with similarly elongate leaves, too many heads for the wild plant, and tremendously multiplied but characteristic rays was described and illustrated as *Aster luteus alatus* by Cornut, Canadensium Plantarum, 62, 63 (1635). The life-sized head and reduced leaves from Cornut's plate are here reproduced as PLATE 797, FIGS. 4 and 5. It will be noted that its disk is 2 cm. broad, its ligules about 1.5 cm. long and 4–5 mm. broad at the sharply toothed summit. It is obviously of the same variety as the plant of the Clifford garden and as that of the Paris garden described and illustrated by Lamarck as his *H. canaliculatum*.

When Sir James Edward Smith purchased and eventually established in London the herbarium of Linnaeus he intimately knew the collection and in his many articles in Rees' Cyclopedia he clearly designated what he understood, from studying the collection and literature, as the types of many Linnean species. Thus, in Rees, Cycl. xvii. (1819), he took as *H. autumnale* the plant of the Linnean Herbarium with "*Leaves* elliptic-lanceolate, . . . more or less deeply serrated. *Flowers* large", etc., while for the plant of European gardens with "*Leaves* linear-lanceolate, entire", etc., the *H. autumnale* sensu Miller, he proposed the new name *H. longifolium* Sm. In treating as typical *Helenium autumnale* the plant which Lamarck had already (1793) selected and which he soon (1797) illustrated I am not only following the very careful Lamarck and Smith but am trying to keep the concept which has prevailed among most botanists until Rydberg. Witness, besides the illustration by Lamarck and the treatment by Smith, the following illustrations of *H. autumnale:* Schkuhr, Bot. Handb. ed. 2, t. 250a (1808); Barton, Fl. N. Am. i. t. 26 (1821); Raf. Med. Fl. i. t. 47 (1828); Hook. in Bot. Mag. lvii. t. 2999 (1830); Meehan, Fl. and Fern U. S. ii. t. 29 (1879); and so on to Britton & Brown, Ill. Fl. iii. 450 (1898) and House, Wild Fl. N. Y. ii. t. 261 (1918). By so doing less violence is done well established and fully justified usage than by taking up for the plant of Linnaeus's own herbarium, labeled by him *H. autumnale,* the name *H. latifolium* Mill., as is done by Rydberg in the N. Am. Fl. xxxiv^{2}. 127 (1915). In there taking up as *H. autumnale* the *H. longifolium* Sm. Rydberg showed that he did not understand the latter. If he had understood it he would not have referred *H. canaliculatum* Lam. (clearly *H. autumnale* sensu Miller and *H. longifolium* Sm.) without question to the synonymy of *H. latifolium;* and if he had understood *H. autumnale* of Herb. L. and of Lamarck, Schkuhr, Smith, Barton *et al.* (*H. latifolium* Mill.) he would not have contented himself with "ligules 10–15 mm. long". In the type they are 2.3 cm. long.

Besides typical *Helenium autumnale* (*H. latifolium* Mill.) and the rather local var. *canaliculatum* (Lam.) Torr. & Gray, Fl. N. Am. ii. 284 (1842), a combination not cited in the North American Flora, we have a wide-ranging southern extreme of the species (PLATE 798), the plant with small and *narrow* rays which was

described as a species, *H. parviflorum* Nutt. Although *H. parviflorum* in most extreme variations is very different from true *H. autumnale*, their ranges overlap and it is most difficult to find any stable morphological character to keep them apart. The chief claim of *H. parviflorum* to recognition is its extension far south of the other varieties, a plant with the flowering and fruiting disk only 0.8–1.5 cm. broad (as opposed to 1.6–2.3 cm. in true *H. autumnale*), the ligules 3–12 mm. long and only 3–7 mm. broad (as opposed to 1.6–2.5 cm. long and 7–12 mm. broad in true *H. autumnale*). For six days (a full week) I have boiled out disk-florets and ligules, seeking in the *H. autumnale* complex some stable characters of disk-corollas, pappus and achenes, and, although there is extreme diversity in the number, shape and length of the pales of the pappus, sometimes short, sometimes much longer and more slender, sometimes in several lengths, and while the disk-corollas may have very short or almost obsolete tubes, or the tubes may be prolonged and the throat more campanulate, I have been quite incapable of making these divergencies fall into clear geographic patterns or associate themselves with other characters. After concentrated study for a week I get back to the decision of Torrey & Gray who wrote: "Some of our varieties are possibly species; but they accord in every thing but the pappus, which also presents every intermediate gradation. The var. β. [the western var. *grandiflorum* (Nutt.) Torr. & Gray] is the only state we have seen from Oregon, Saskatchewan, &c.: but a state with a nearly similar pappus is common in New York; while other specimens, otherwise undistinguishable, present a reduced and merely acute pappus".—Torr. & Gray, l. c. (1842). Torrey & Gray had a score or so of specimens; the ten score of specimens from which I have boiled (to clarify and straighten) the florets have failed to bring any more clarification than they could get from their hand-full of material.

Excluding the plants from west of the "Manual range", the great bulk of inclusive *Helenium autumnale* seems to me to fall into three recognizable geographic varieties:

HELENIUM AUTUMNALE L. Sp. Pl. ii. 886 (1753) in part (as to plant of Herb. L. bearing the identification of Linnaeus); Lam. in Journ. d'Hist. Nat. ii. 215 (1793) and Ill. iv. t. 688, fig. 1 (1797);

Schkuhr, Bot. Handb. ed. 2, t. 250a (1808); Smith in Rees, Cycl. xvii (1819); Barton, Fl. N. Am. i. t. 26 (1821); Raf. Med. Fl. i. t. 47 (1828); Hook. in Bot. Mag. lvii. t. 2999 (1830); Torr. & Gray, Fl. N. Am. ii. 384 (1842); Meehan, Fl. and Ferns U. S. ii. t. 29 (1879); Britton & Brown, Ill. Fl. iii. 450 (1898); House, Wild Fl. N. Y. ii. t. 261 (1918). *H. latifolium* Mill. Gard. Dict. ed. 8, *Helenium* no. 2 (1768); Rydb. in N. Am. Fl. xxxiv[2]. 127 (1915) as to plant, not as to most citations. *Helenia autumnalis* Hill, Hort. Kew. 6 (1769). *Helenium pumilum* Willd. Enum. Suppl. 60 (1813). *H. altissimum* Link ex Rydberg l. c. 126 (1915).—Stem 0.5–1.5 m. high, wing-angled, simple or branching, corymbose-branched at summit; leaves elliptic, oblong or lanceolate, acuminate, membranaceous, the larger coarsely dentate ones 0.5–1.6 dm. long and 2–5.5 cm. broad; heads few-many, peduncled, in terminal corymb; fully developed disk 1.6–2.3 cm. broad; ligules flat, cuneate, deep yellow, soon reflexed, 1.6–2.5 cm. long, 7–12 mm. broad at the bluntly toothed or lobed summit; pappus much shorter than to two thirds as long as disk-corolla.—Rich thickets, meadows and shores, western New England to Minnesota, south to New Jersey, western North Carolina, Kentucky and Missouri, northward passing into var. *canaliculatum*, southward into var. *parviflorum*. A few fairly typical specimens are the following. Massachusetts: Stockbridge, September 5, 1912, *R. Hoffmann;* Sheffield, September 30, 1919, *Churchill.* Connecticut: Hartford, September 15, 1882, *Chas. Wright;* East Haven, October 7, 1902, *Woodward.* New York: Canton, *Phelps*, no. 1001; South Bay, Madison County, *House*, no. 10,815; Sylvan Beach, Oneida Co., *House*, nos. 2843 and 8705; Dryden, *MacDaniels & Eames*, no. 1313. New Jersey: Fieldsboro, *Long*, no. 18,221; southwest of Harrisonville, *Long*, no. 45,269. Pennsylvania: Washington Crossing, Bucks County, September 25, 1923, *Meredith:* Wissahickon Ravine, Philadelphia County, September 24, 1924, *Henry A. Lang;* Sayre, *Barbour*, no. 815. West Virginia; Greenbrier River, Pocahontas County *Greenman*, no. 534; Hendricks, Tucker County, *Greenman*, no. 536. Ontario: Tobermory, *Krotkov*, no. 7908 (mixed with var. *canaliculatum*). Ohio: Garrettsville, Portage County, *R. J. Webb*, no. 400. Illinois: Bloomington, August, 1886, *B. L. Robinson.* Our plate 796.

Var. canaliculatum (Lam.) Torr. & Gray, Fl. N. Am. ii. 284 (1842). *H. autumnale* L. Sp. Pl. ii. 886 (1753) in part, as to some citations, not as to plant of Linnean Herb. designated by Linnaeus; Mill. Gard. Dict. ed. 8 (1768); Rydb. in N. Am. Fl. xxiv[2]. 127 (1915). *H. pubescens* Ait. Hort. Kew. iii. 227 (1789). *H. canaliculatum* Lam. in Journ. d'Hist. Nat. ii. 213, t. 35 (1793). *Helenia decurrens* Moench, Meth. 589 (1794), both as to description and citation only of the Morison figure which is of most

characteristic *H. canaliculatum*, and obviously copied from Cornut. *Helenium longifolium* Sm. in Rees, Cycl. xvii, *Helenium* no. 2 (1819). *H. autumnale pubescens* (Ait.) Britton in Mem. Torr. Bot. Cl. v. 339 (1894).—Stem relatively slender, 3.7–9 dm. high with 1–many heads; leaves linear to lanceolate, entire or shallowly denticulate, firm, subrigid, the larger ones 3–12 cm. long and 3–18 mm. broad; mature disk 1–2 cm. broad, ligules strongly narrowed and often convolute at base, 1–2 cm. long, and 2–7 mm. broad at the shallowly and sharply to bluntly toothed summit.—Estuary of the St. Lawrence River, Quebec, west to Minnesota and Nebraska, south to Massachusetts (adventive), New York and northern Ohio, Indiana, Illinois, Missouri, Texas and Arizona.[1] Some characteristic specimens are as follows: QUEBEC: Cap Rouge, *Victorin*, no. 28,177; St. Vallier, *Svenson & Fassett*, no. 3022; Berthier, Montmagny County, *Fernald & Pease*, no. 25,324; Longueuil, *Victorin*, no. 18,376; Boucherville, *Victorin*, no. 27,574. MASSACHUSETTS: Clam Shell Bluff, Concord, September 9, 1934, *R. J. Eaton* (adventive, leaves more toothed than in most material). NEW YORK: Canton, *Phelps*, no. 1002; Springport, *Eames & Wiegand*, no. 11,007. ONTARIO: Tobermory, *Krotkov*, no. 7908 (mixed with typical *H. autumnale*); Birch Island, Lake Huron, *Macoun*, no. 26,508 (distributed as *H. huronense* Britton, an herbarium-name unfortunately published in synonymy, therefore with no status, by Rydberg in N. Am. Fl. xxxiv[2]. 127 (1915)). OHIO: Windham Township, Portage County, *R. J. Webb*, no. 5554. WISCONSIN: St. Croix Falls, August 20, 1900, *C. F. Baker;* La Crosse, *Pammel.* ILLINOIS: Aurora, September, 1882, *T. E. Boyce;* Urbana, *Pease*, no. 12,504. MINNESOTA: Lake City, August 15, 1883, *W. H. Manning.* IOWA: Iowa Falls, Hardin County, August, 1928, *M. E. Peck;* Redfield, Dallas County, August 27, 1867, *J. A. Allen;* Fayette, August, 1894, *Fink.* NEBRASKA: Beaver Creek, Holt Co., *Fred Clements*, no. 2858; South Fork of Dismal River, *Rydberg*, no. 1690. MISSOURI: Dodson, *Bush*, no. 4148, distrib. as *H. montanum;* Columbia, Boone Co., *Lisle Jeffrey*, no. 261. KANSAS: Chautauqua Co., *Hitchcock*, no. 737. TEXAS: banks of streamlets about Friedrichsburg, *Lindheimer*, no. 477. ARIZONA: cañon at Fort

[1] Passing westward, from Saskatchewan and North Dakota to eastern Washington, south to New Mexico, into the shorter- and broader-leaved

Var. **montanum** (Nutt.), **stat. nov.** *H. montanum* Nutt. in Trans. Am. Phil. Soc. n. s. vii. 384 (1841).

For note on *H. autumnale pubescens* (Ait.) Britton see p. 492. It is probable that Aiton had the two plants which were in general cultivation in Europe, not the western var. *montanum* to which Rydberg doubtfully refers var. *pubescens*.

Farther west, in British Columbia, Washington and Oregon, becoming the large-flowered

Var. GRANDIFLORUM (Nutt.) Torr. & Gray, Fl. N. Am. ii. 384 (1842); Gray, Syn. Fl. N. Am. i[2]. 349 (1884); independently published by Howell, Fl. Nw. Am. 359 (1900). *H. grandiflorum* Nutt. l. c. (1841).

Huachuca, *Lemmon*, no. 2776. Plate 797.—Many specimens transitional to the preceding and the following, and on the Plains of the West to var. *montanum*.

Aiton, Hort. Kew. iii. 227 (1789), had a *H. pubescens*, described simply "H. foliis pubescentibus". Torrey & Gray and, later, Gray treated it as synonymous with the inclusive *H. autumnale*, of which the typical variety is subglabrous, in both places wrongly citing the page as "287". In Mem. Torr. Bot. Cl. v. 339 (1894) we get the unexplained combination *H. autumnale pubescens* Britton, based upon *H. pubescens* Ait. of page "287". Had the author of the new trinomial looked up Aiton, instead of copying the error of Torrey & Gray and of Gray, he would have noted that *H. pubescens* was on p. 227. I have not seen Aiton's type; neither had Britton. From the date (1789) it is probably var. *canaliculatum*.

*Var. **parviflorum** (Nutt.) stat. nov. *H. parviflorum* Nutt. in Trans. Am. Phil. Soc. ser. 2, vii. 384 (1841).—Leaves membranaceous or submembranaceous, elliptic, oblong, lanceolate or oblanceolate, coarsely toothed to subentire, the larger ones 0.5–1.5 dm. long and 0.7–3.5 cm. broad; mature disk 0.8–1.5 cm. broad; ligules 3–12 mm. long and 3–7 mm. broad, often canaliculate below.—Bottomlands, swamps and other low grounds, Florida to Arkansas, north to Connecticut, New York, Pennsylvania, Kentucky, Illinois and southeastern Iowa, thoroughly typical and isolated southward, passing insensibly into the two preceding northward. The following, from a very large series before me, are characteristic. Connecticut: Sprague, August 9, 1900, *Woodward;* Selden Cove, Lyme, August 29, 1901, *Bissell;* Stratford, August 16, 1895, *Eames*. New York: old specimens without designated locality, *Torr. & Gray, Fl.* New Jersey: east of Silverton, Ocean County, *Fogg*, no. 4901 (narrowest-leaved extreme); Mays Landing, August 28, 1910, *W. Stone;* Cold Spring, *Fogg*, no. 235; Treasure Island, Hunterdon County, *Long*, no. 38,291. Pennsylvania: Delaware County, 1861, *Canby*, called by Gray *H. parviflorum*, with the later comment "Passes for but ??", the material (relatively thin-leaved) marked by Rydberg as *H. longifolium* Sm., i. e. *H. autumnale* var. *canaliculatum;* Dillerville Swamp, Lancaster County, September 18, 1889, *Heller*. Delaware: Bayville, Sussex County, *Fogg*, no. 11,271; north of Leipsic, Kent County, *Fogg*, no. 6230. West Virginia: Roland Park, Cabell County, *Gilbert*, no. 546. Virginia: Hunting Creek, southwest of Alexandria, *G. H. Shull*, no. 188; Bedford County, September, 1873, *A. H. Curtiss;* Jamestown Island, James City County, *Fernald &*

Long, no. 11,204; Kittewan Creek, Weyanoke, Charles City County, *Fernald & Long*, no. 11,483; near Creeds, Princess Anne County, *Fernald, Long & Fogg*, no. 5139; Northwest, Norfolk County, *Fernald & Long*, no. 14,068; northwest of Suffolk, *Fernald & Long*, no. 13,833; Factory Hill, Nansemond County, *Fernald & Long*, no. 4914; south of South Quay, Nansemond County, *Fernald & Long*, no. 11,482; southeast of Burgess, Dinwiddie County, *Fernald & Long*, no. 7713; southeast of Stony Creek, Sussex County, *Fernald & Long*, no. 13,832; Meherrin River, south of Edgerton, Brunswick County, *Fernald & Lewis*, nos. 14,515 (leaves short, broad and sparsely toothed) and 14,516 (leaves narrower and sharply and copiously toothed). North Carolina: near Hillsboro, Columbus County, *Godfrey*, no. 6278; north of Burgaw, Pender County, *Godfrey*, no. 6537; near Sunford, Lee County, *Godfrey*, no. 6911; Winston-Salem, *Godfrey*, no. 6094; Sylva, Jackson County, September 18, 1897, *E. E. Magee*. South Carolina: near Georgetown, *Godfrey & Tryon*, no. 8240. Georgia: Macon, September 3, 1883, *J. D. Smith;* Warsaw, Long County, *Eyles*, no. 7655. Florida: St. Mark's, Wakulla County, *Nash*, no. 2534; Apalachicola, *Biltmore Herb.*, no. 515a. Kentucky: near Wasioto, Bell County, *Kearney*, no. 506. Tennessee: Knoxville, *W. A. Anderson*, no. 638; Townsend, September 26, 1936, *Luther Burns*. Alabama: without stated locality, *Nuttall* (possible type or isotype of *H. parviflorum* —bearing Nuttall's asterisk and entirely agreeing with his description, although as noted by Gray, Syn. Fl. i^2. 349, Nuttall cited it as from Georgia); on Bogue Chitto, Perry County, September 1, 1885, *J. D. Smith;* near Marion, Perry County, September 2, 1885, *J. D. Smith;* Auburn, Lee County, *Earle & Earle*, no. 89. Mississippi: Taylorville, *Tracy*, no. 8529; Jackson, September 6, 1885, *J. D. Smith*. Illinois: Champaign, *Pease*, no. 12,389; Peoria, September, 1904, *F. E. MacDonald*. Iowa: Keosauqua, *Pammel & Reis*, no. 465. Missouri: Bakersfield, Ozark County, *E. J. Palmer*, no. 32,829; Greenwood, *Bush*, no. 4134; Noel, *Bush*, nos. 5265 and 5270. Plate 798.

In the plastic group with disk globose or globose-ovoid and usually brown or purplish, the receptacle ovoid and the ray-flowers sterile or neutral, Rydberg treats both *Helenium nudiflorum* Nutt. and *H. polyphyllum* Small as good species. Only by recognizing the smallest specimens with narrowest cauline wings as the former, the largest ones with broadest wings as the latter, ignoring the large series of transitional specimens can one do so. The intermediate pile is altogether too large; but in our Southeast there are two extremes, native of low woods and swamps and evidently local endemics, which seem to be really

well defined species. In typical campestrian and aggressively weedy *H. nudiflorum* (including *H. polyphyllum*) the pales of the pappus are narrowly lanceolate to lance-ovate and 0.5–1.6 mm. long, the pales attenuate to narrow tips or scabrous awns, the firm and usually scabridulous cauline leaves linear to narrowly lanceolate or oblanceolate. In southeastern South Carolina, however, there is a plant of this series, occurring in low woods or in wooded bottomlands, with membranaceous and quite smooth cauline leaves lance- to elliptic-oblong, the pappus of blunt and awnless round or oval small pales. This I am calling

H. **Godfreyi,** sp. nov. (tab. 799, fig. 1 et 2), *H. nudifloro* habitu simillima; foliis caulinis membranaceis laevibus lanceolato-vel elliptico-oblongis; achaeniis glabris verrucosis, pappi paleis albidis suborbicularibus vel ovalibus muticis 0.4–1.4 mm. longis.—South Carolina: creek-bottom through rich lowland-woods, 4 miles west of Georgetown, June 27, 1939, *Godfrey & Tryon*, no. 124; cleared strip along logging railroad through floodplain-forest, Santee River, 3 miles northeast of Pineville, Berkeley County, July 14, 1939, *Godfrey & Tryon*, no. 586 (type in Herb. Gray.).

This localized species is named for Robert Kenneth Godfrey whose extensive field-work is greatly clarifying our knowledge of Carolina plants.

Another relative of *Helenium nudiflorum* is concentrated in the northern half of Florida. In this plant the relatively small heads are either rayless or with well developed ligules, but the ovate pappus-pales (1–1.6 mm. long) are rounded at tip and terminated by a very long, filiform and smoothish awn. This plant seems worthy of recognition as

H. **floridanum,** sp. nov. (tab. 799, fig. 3 et 4), capitulis valde corymbosis radiatis vel eradiatis; pappi paleis 1–1.6 mm. longis ovatis apice rotundatis abrupte aristatis, aristis filiformibus laevibus.—Florida: moist ground near Jacksonville, May 28, 1891, *Curtiss*, no. 4972; low grounds, Duval County, July, *Curtiss*, no. 1520; hummock-land, Eustis, Lake County, April 15–30, 1894, *Nash*, no. 550; around ponds in pine woods, Sumter County, June 5, *Curtiss*, no. 11; low open woods near Fitzgerald, Hernando County, June 14, 1900, *Curtiss*, no. 6663 (type in Herb. Gray., distributed by Curtiss with an unpublished varietal name and with the note: "Uniformly without rays along the Withlacoochee River"); waste ground in Tampa, June 1, 1886, *Curtiss*, no. 12.

PLATE 796 is of HELENIUM AUTUMNALE L., × 1: FIGS. 1 and 2, portions of TYPE in Linnean Herb., original photograph through kindness of Mr. *S. Savage;* FIG. 2, summit of plant from Garrettsville, Portage County, Ohio, *R. J. Webb,* no. 400.

PLATE 797, H. AUTUMNALE, var. CANALICULATUM (Lam.) Torr. & Gray, × 1, except FIG. 5: FIG. 1, portion of *Helenia foliis decurrentibus,* etc. of Hortus Cliffortianus, courtesy of Dr. *John Ramsbottom;* FIG. 2, summit of plant from River St. Lawrence, Berthier, Montmagny County, Quebec, *Fernald & Pease,* no. 25,324; FIG. 3, portion of original plate of *H. canaliculatum* Lam.; FIGS. 4 and 5, portions of illustration of *Aster luteus alatus* of Cornut, Canad. Pl. (1635).

PLATE 798, H. AUTUMNALE, var. PARVIFLORUM (Nutt.) Fern., × 1: FIG. 1, portion of TYPE or ISOTYPE of *H. parviflorum* Nutt.; FIG. 2, summit of plant from south of South Quay, Nansemond County, Virginia, *Fernald & Long,* no. 11,482.

PLATE 799, FIGS. 1 and 2, H. GODFREYI, n. sp.: FIG. 1, TYPE, × ½; FIG. 2, achene, × 10. FIGS. 3 and 4, H. FLORIDANUM, n. sp.: FIG. 3, fragment of TYPE, × 1; FIG. 4, achene, × 10. FIG. 5, achene, × 10, of H. NUDIFLORUM Nutt., from Emporia, Virginia, *Fernald & Long,* no. 10,451.

SENECIO AUREUS AND ITS GEOGRAPHIC VARIETIES AND ALLIES IN EASTERN NORTH AMERICA (PLATES 800–806)—To one who from boyhood has known as *Senecio aureus* the common glabrous or promptly glabrate plant of peaty meadows, swales and swampy thickets of New England, New York and Pennsylvania, with suborbicular to round-ovate obtusely crenate radical leaves which are tufted from very slender and cord-like elongate rhizomes and basal offshoots, it is very disconcerting on every trip to tidewater Virginia to see as a dominating plant of calcareous woods and fertile bottomland, never in meadows and boggy places, a coarser plant with stout almost finger-like purple basal offshoots, very large heads and, when young, a copious long tomentum at the bases of the petioles, on the unexpanded leaf-surfaces and over the unexpanded corymb, and to be obliged to call it also *S. aureus.* So different is this southern plant of rich woods from the common plant of swamp and swale northward that it, again, comes as a surprise to find that it is true *S. aureus* L. Sp. Pl. ii. 870 (1753). Linnaeus based the species primarily upon the Clayton collection, nos. 249 and 286, from Virginia, described by Gronovius, with a second reference to the *Jacobaea virginiana* of Morison and of Ray. The Clayton plant, which is the TYPE (our PLATE 800, FIG. 1) is very characteristic material of the woodland species of eastern Virginia, and phrases in the account by Gronovius but not quoted by Linnaeus are peculiarly significant to one who knows the southern plant, "leviter superne lanatis, radice parva atro-rubente", for the woodland plant of tidewater Virginia is

very striking on account of the purple or dark red stiff rhizomes and basal offshoots and the lanate tomentum of the unexpanded corymb. "Madidis & umbrosis gaudet" of the Clayton account is also wholly satisfactory. So is the contradiction between the brief italicised diagnosis of Gronovius with "*foliis crenatis*" and the fuller account below "foliis infimis rotundis ad marginem serratis", for the type shows the margin serrate-dentate or with somewhat emarginate-truncate teeth as in some of the southern specimens, while the phrase "foliis crenatis", taken over by Linnaeus, fits other specimens.

Since the common plant of the northeastern states differs in several characters from typical southern *Senecio aureus*, standing midway between it and var. *gracilis* (Pursh) Wood, and since the more northern membranous-leaved plant (of Newfoundland, Anticosti, Gaspé, northern New England, etc.) which has erroneously passed as the Cordilleran *S. pseudaureus* Rydb., needs clarification, I am here summarizing my interpretaion of the varieties of *S. aureus:*

a. Radical leaves dentate with rounded or blunt teeth....*b.*

b. Undivided basal leaves suborbicular to round-ovate, broadly rounded at summit, with a well defined cordate base.

Basal offshoots at flowering time 4–10 mm. thick, deep red or purple; margins of basal sheaths of many petioles, surfaces of unexpanded leaves and unexpanded corymbs with long dense flocculent tomentum; involucres 8–11 mm. high; disk-corollas 6–10 mm. long; achenes 3.5–4 mm. long.....*S. aureus* (typical).

Basal offshoots at flowering time 1–5 mm. thick, green to purple; margins of basal sheaths of petioles, surfaces of unexpanded leaves and unexpanded corymbs glabrous or sparsely short-tomentose and glabrescent; involucres 5–8 (–9) mm. high; disk-corollas 5–8 mm. long; achenes 2–3.5 mm. long.

Stems 3–9 dm. high, often 2 or more; rhizomes and basal offshoots mostly 2–10 cm. long; radical leaves becoming firm and subcoriaceous, the larger ones 6–15 cm. long and 3–12 cm. broad, often purplish beneath, the longer petioles 0.5–3 dm. long; involucres 5–9 mm. high.....Var. *intercursus.*

Stems slender, mostly solitary, 2–6 dm. high; basal offshoots rarely 6 cm. long; radical leaves membranaceous, 1–3.5 cm. long, 1–2.8 cm. broad, green both sides, the longer petioles 2–10 cm. long; involucre 5–7 mm. high.....Var. *gracilis.*

b. Undivided basal leaves oblong-oval, rounded to base or some of them barely subcordate, the larger blades 2–6.5 cm. long and 1.5–4.3 cm. broad, submembranaceous.....Var. *semicordatus.*

a. Radical leaves sharply serrate or dentate at least at base to acutely or subacutely lacerate, ovate or oval to rotund, deeply cordate, acute to rounded at tip, membranaceous. Var. *aquilonius.*

S. AUREUS L. Sp. Pl. ii. 870 (1753). Var. *Ashei* Greenm. in Ann. Mo. Bot. Gard. xvi. 406, pl. 35 (1929).—Rather stout; stiff basal offshoots purple, 3–15 cm. long; flowering stems 3–12 dm. high; radical leaves rounded- to oblong-ovate, becoming coriaceous, in maturity up to 2.2 dm. long and 1.8 dm. broad.—Rich calcareous woods and wooded bottomlands or in upland meadows, Florida to Arkansas, north to Virginia, Kentucky and Missouri. The following are characteristic. VIRGINIA: locality not stated, "Madidis & umbrosis gaudet", *Clayton* (TYPE, photo in Gray Herb., our PLATE 800, FIG. 1); rocky bank of brook north of Hopewell Gap, western slope of Bull Run Mountain, *Allard*, no. 4540; margin of woods, east of Wattsville, Accomac County, *R. R. Tatnall*, no. 4441; damp woods, Eastville, April 21, 1935, *M. Ellyson & E. Puette;* rich woods, Great Neck, Princess Anne County, *Fernald & Griscom*, no. 4517; low woods, Cypress Swamp, north of Dendron, *Fernald, Long & Abbe*, no. 14,243; rich alluvial woods, east of Cabin Point, *Fernald & Long*, no. 7985; bottoms of rich calcareous wooded ravines west of Claremont, *Fernald & Long*, no. 12,893; sandy alluvial woods, bottomland of Powell Creek, Garyville, *Fernald & Long*, no. 7984. NORTH CAROLINA: wet, shady ground, Biltmore, *Biltm. Herb.* no. 889[a]. FLORIDA: banks of Little River, *Chapman.* TENNESSEE: Maryville, Blount County, May 8, 1937, *Godfrey;* low wooded slope along Bean's Creek, Franklin County, *Svenson*, no. 10,018. MISSOURI: along James R., south of Springfield, Greene Co., September, 1934, *Richard Smith & Lisle Jeffrey;* along Shoal Creek, southwest of Joplin, *E. J. Palmer*, no. 29,936. ARKANSAS: wet places, "N. W. Arkansas", April, 1888, *Harvey*, no. 45. See p. 361. PLATES 800, FIG. 1, and 801.

Senecio aureus in southeastern Virginia definitely crosses with *S. tomentosus* Michaux. In April, 1942, Long, Abbe and I found (see p. 361) an extensive colony growing at the upper border of bottomland-woods of Cypress Swamp near Dendron, with typical *S. aureus* in the woods, typical *S. tomentosus* in the open. The intermediate plants, some with narrow and merely round- to tapering-based radical leaves suggesting those of *S. tomentosus*, others with them broader and subcordate, all more or less tomentulose and with tomentose to glabrescent petioles, has the involucres tomentose. It is clearly *S. aureus* × *tomentosus*. Foliage-material, misidentified as *S. Crawfordii* Britton, from a wooded ravine west of Claremont, *Fernald & Long*, no.

12,892, is very similar but smoother, and its stout and elongate horizontal rhizome keeps it out of *S. Crawfordii* (see p. 506). It was a single plant growing with typical *S. aureus*, with *S. tomentosus* abundant only a few rods away. That much is clear.

In Ann. Mo. Bot. Gard. xiv. 406, pl. 35 (1929) Greenman described as *S. aureus*, var. *Ashei* a plant of western Virginia and adjacent northeastern Tennessee, there growing in moist meadows. Evidently having in mind as true *S. aureus*[1] the glabrescent plant of wide northern and continental range, the author of var. *Ashei* emphasized for the latter the distinctive characters of typical southern *S. aureus:* "foliis inferioribus longe petiolatis . . . crenato-serratis juventate utrinque albo-floccoso-tomentosis supra denique plus minusve glabratis". Evidently puzzled by the presence of tomentum on the young and unexpanded basal leaves in his var. *Ashei*, just such pubescence as occurs on the youngest basal leaves of the plant of Clayton's region (see PLATE 801, FIG. 3), and frequently on the involucre as well (see FIG. 5), Greenman surmised that this plant of the mountain-region of western Virginia and eastern Tennessee might be a hybrid of his *S. aureus* (presumably our var. *intercursus*) and the coastal plain *S. tomentosus:* "The origin of the plant is not known . . . It may be a hybrid. There are some indications that it may be a hybrid between *Senecio aureus* L. and *Senecio tomentosus* Michx. The former of these two species occurs in the valley of the South Fork of the Holston River, and the latter species is relatively common in eastern Virginia. While the habit of the new plant is like *Senecio aureus*, yet the prevailing outline of the leaves of the offshoots and those of the lower parts of the upright stem, as well as their texture and tomentose character, suggests *Senecio tomentosus.*"—Greenm. l. c. 405. The type of *S. aureus* var. *Ashei* was poorly collected, showing no rhizomes, but in outline of basal leaves and cauline leaves (so far as the mashed and crumpled leaves show) the foliage looks quite like that of the TYPE of *S. aureus* and of the characteristic specimens above cited and illustrated (PLATES

[1] Among the specimens taken by Dr. Greenman to Berlin for his preliminary studies one in the Gray Herbarium of a small plant midway between vars. *gracilis* and *intercursus*, from Rhode Island, bears the pencilled memorandum: "This specimen of Thurber's corresponds very well with specimens of *S. aureus* L. in herb. Willdenow at Berlin". The Thurber specimens and specimen like it at Berlin (if not now destroyed) are very different from the Clayton type.

800, FIG. 1 and 801). Although on the coastal plain true and characteristic *S. aureus* rarely crosses with *S. tomentosus*, producing a pretty mixed progeny, some plants with horizontal rhizomes and basal offshoots of *S. aureus*, others cespitose as in *S. tomentosus*, there is no reason to imagine that the cespitose, heavily and permanently tomentose *S. tomentosus*, with its narrow and noncordate radical leaves, its undivided or but shallowly toothed cauline leaves, its columnar and heavily hirtellous drab achenes (PLATE 800, FIG. 3) with prominent rounded ridges—there is no reason to imagine that such a plant, restricted to sterile soils of the Coastal Plain and adjacent provinces, had anything to do with the origin of the continental and upland species of rich or calcareous areas, with horizontal elongate rhizomes and basal offshoots, oval to orbicular and deeply cordate glabrous or glabrescent radical leaves, glabrous and deeply pinnatisect cauline ones, and glabrous, slender brown to reddish achenes (FIG. 2) without very prominent ridges. The cited stations of *S. aureus*, var. *Ashei* are more than 200 miles west of the nearest stations known for *S. tomentosus!*

Senecio aureus, var. *aurantiacus* Farwell in Am. Midl. Nat. xii. 74 (1930) is described as having red stems and "traces of floccose tomentum present throughout the plant at the flowering time". Its distinctive character, "Ligules . . . 3–4 lines long . . . , orange-red, reflexed" is one unknown to me. The description otherwise does not make clear what var. *aurantiacus* may be, in a region where many variations occur.

Var. **intercursus,** var. nov. (TAB. 802), planta glabra vel glabrata; rhizomatibus sobolibusque horizontalis 2–5 mm. crassis sobolibus plerumque 2–10 cm. longis; foliis radicalibus rotundo- vel late oblongo-ovatis cordatis, laminis glabris deinde subcoriaceis crenatis vel obtuse dentatis ad 6–15 cm. longis ad 3–13 cm. latis utrinque viridibus vel subtus purpurascentibus, petiolis longioribus 0.5–3 dm. longis; involucris glabris vel glabratis 5–9 mm. altis; disci corollis 5–8 mm. longis; achaeniis 2–3.5 mm. longis.—Meadows, boggy swales, swamps and low woods, southern Quebec to Michigan, south to Nova Scotia, New England, Pennsylvania, upland to Alabama, Kentucky and Missouri. TYPE: Tewksbury, Massachusetts, June 7, 1902, *E. F. Williams* in Gray Herb.

Var. *intercursus*, standing between the coarse, southern typical *Senecio aureus* and the smallest variety of the species, var.

gracilis (Pursh) Wood, is the plant most generally passing as typical *S. aureus*.

*Var. INTERCURSUS I have seen from Virginia only from ROANOKE COUNTY: moist woods along Back Creek, south-southeast of Starkey Post Office, *C. E. Wood, Jr.*, no. 3988. It is presumably of broader upland range.

Var. GRACILIS (Pursh) Wood, Class-Bk, 211 (1845), independently published as a new comb. by Britton in Britt. & Brown, Ill. Fl. iii. 481 (1898). *S. gracilis* Pursh, Fl. Am. Sept. ii. 529 (1814).—Meadows, swamps and bogs, Massachusetts to North Dakota (acc. to Greenman), south to North Carolina and Arkansas.

Var. SEMICORDATUS (Mackenzie & Bush) Greenm. in Ann. Mo. Bot. Gard. iii. 129 (1916). *S. semicordatus* Mackenz. & Bush in Mo. Bot. Gard. Ann. Rep. xvi. 107 (1905). *S. aureus* × *Balsamitae* Greenm. in RHODORA, x. 69 (1908).—Calcareous thickets, shores, meadows, etc., locally abundant, western Newfoundland; Gaspé Peninsula, Quebec, to southern Ontario, south to northern New Brunswick, Eastern Townships, Quebec, northern Ohio, Illinois and Missouri.

S. AUREUS L., var. **aquilonius,** var. nov. (TAB. 803), planta valde rhizomatosa, rhizomatibus gracilibus valde horizontaliterque elongatis (ad 3 dm. longis); foliis basilaribus membranaceis ovatis vel ovalibus vel rotundis serratis vel acute vel subacute incisis ad basin valde cordatis; foliis caulinis membranaceis basi pinnatifidis.—Newfoundland and Côte Nord and Anticosti Island, Quebec, to Algoma District, Ontario, south to Cape Breton, Prince Edward Island, northern New Brunswick, northern New England, northern New York, northwestern Pennsylvania, northern Ohio, northern Indiana and Wisconsin. Many specimens previously misidentified with the western *S. pseudaureus* Rydb. The following, selected from a very large series, are characteristic. NEWFOUNDLAND: brookside, Grand Falls, July 3, 1911, *Fernald & Wiegand*, no. 6398; park-like openings in damp mossy woods on the Silurian hills back of Birchy Cove (Curling), July 5, 1910, *Fernald & Wiegand*, no. 4174; spruce woods and thickets, slope of Lookout Mountain, Bonne Bay, *Fernald, Long & Fogg*, no. 2145; brooksides and damp bushy ravines on the limestone tableland, alt. 200–300 m., Table Mountain, Port à Port Bay, July 16 and 17, *Fernald & St. John*, no. 10,872; damp openings in woods near Overfall Camp, Great Codroy River, July 7, 1939, *Pease & Edgerton*. QUEBEC: dans les bois claire près de la rivière, Rivière de Rénard, Anticosti, 5 août 1927, *Victorin & Rolland*, no. 27,645; dans les bois de Conifères, R. Vaureal, Anticosti, 12 août 1927, *Victorin & Rolland*, nos. 27,640 and 27,641; mossy Arbor Vitae woods east

of Grande Coupe, Percé, August 6, 1907, *Fernald & Collins*, no. 1208; springy meadows in woods at 600 m. altitude, North Fork of Madeleine River, Gaspé County, July 31, 1923, *Fernald, Dodge & Smith*, no. 26,096; calcareous alpine meadows, alt. 1000–1125 m., Table-top Mountain, August 7, 1906, *Fernald & Collins*, no. 260; coniferous forest, "Low's Trail" from the Forks of the R. Ste. Anne des Monts to Table-topped Mountain, July 31 and August 14, 1906, *Fernald & Collins*, nos. 765, 766 (TYPE in Herb. Gray), 767; wet alluvial shores, between Baldé and the Baie des Chaleurs, Bonaventure River, August 5–8, 1904, *Collins, Fernald & Pease;* gravel-beaches and bars between the Forks and Brulé Brook, Little Cascapedia River, July 29 and 30, 1904, *Collins, Fernald & Pease* (*Pease*, no. 5022); slaty bank, Restigouche River, July 24–25, 1929, *Rousseau & Bonin*, no. 32,211. NOVA SCOTIA: Barrasois R., Cape Breton, *Nichols*, no. 852. PRINCE EDWARD ISLAND: swampy *Larix* and *Thuja* woods, Tignish, *Fernald, Long & St. John*, no. 8245. MAINE: wet thicket, Limestone, June 22, 1898, *Fernald;* arbor-vitae swamp, Presque Isle, July 12, 1902, *Williams, Collins & Fernald;* cedar-swamps and clearings, Blaine, June 23, 1898, *Fernald* no. 2404; damp thicket, Patten, August 23, 1897, *Fernald;* wet open woods, Roque Bluffs, July 23, 1914, *C. H. Knowlton;* meadow near Half-moon Stream, Unity, June 16, 1935, *G. B. Rossbach*, no. 926; wet ground, open woods, Clinton, July 8, 1909, *R. C. Bean;* South Poland, 1895, *Kate Furbish.* NEW HAMPSHIRE: damp shady roadside between First and Second Lakes, Pittsburg, July 6, 1907, *A. H. Moore*, no. 3523, *Pease*, no. 10,316; wet place in woods, Hill, August 29, 1933, *Chas. Bullard;* rich woods, Durham, June 21, 1939, *Hodgdon*, no. 4034. NEW YORK: Oneida, May 15, 1918, *House.* PENNSYLVANIA: Corry, May 7, 1896, *J. R. Churchill.* ONTARIO: black-ash swamp, Sault Ste. Marie, July 18, 1935, *Taylor et al.*, no. 1687. OHIO: Garrettsville, Portage County, *Webb*, no. 202. MICHIGAN: tamarack swamp, south of Ann Arbor, May 8, 1898, *S. H. Burnham;* Port Huron, May 18, 1896, *C. K. Dodge.* INDIANA: along a brook, Otis, May 20, 1911, *Sherff.* WISCONSIN: Brown County, June 11, 1900, *Schuette.*

Senecio aureus, var. *aquilonius* is the northeastern plant which has recently been passing in my own work and that of others as *S. pseudaureus* Rydb. It certainly strongly suggests the plant of the Cordilleran region in the texture and toothing of its basal leaves and the tendency to laceration and enlargement of the lower cauline blades. *S. pseudaureus*, however, has a stout and relatively short rhizome which usually forks into a tuft of crowded ascending crowns; its basal leaves tend to be oblong-ovate as in

S. aureus, var. *semicordatus* (Mackenz. & Bush) Greenm. and only slightly, if at all, more cordate, though sometimes broader, on thickish petioles 1–10 (rarely –23) cm. long; its pale-flowered heads are on pedicels 1–5 (rarely –9) cm. long. *S. aureus*, var. *aquilonius* stands off from it through its slender and horizontally creeping rhizome (up to 3 dm. long), with scattered ascending branches and tufts of leaves or flowering stems; it thus belongs with *S. aureus* var. *intercursus* and passes into it. Its basal leaves are ovate to oval or even orbicular, deeply cordate, on filiform petioles mostly 0.5–2.5 dm. long; and its deep yellow-flowered heads are on filiform pedicels mostly 3–12 cm. long.

S. AUREUS, var. AQUILONIUS, forma **ecoronatus** (Fernald) comb. nov. *S. pseudaureus*, forma *ecoronatus* Fernald in RHODORA, XXX. 225 (1928).

S. PAUPERCULUS Michx., forma **inornatus,** f. nov., foliis basilaribus indivisis angusto oblanceolatis laminis 1.5–2.3 cm. longis 0.5–0.7 cm. latis; foliis caulinis valde reductis majoribus 1.5–3.5 cm. longis 2–5 mm. latis; phyllariis[1] lineari-attenuatis; floribus discoideis, ligulis nullis.—MICHIGAN: limestone pavement, Seul Choix School, Schoolcraft County, July 12, 1935, *Pease & Ogden*, no. 24,946 (TYPE in Herb. Gray.). ALASKA: Miller House, on Steese Highway, 115 miles north of Fairbanks, elevation 2100 feet, July 12–18, 1940, *Edith Scamman*, no. 2166.

Not to be confused with *Senecio pauperculus*, forma *verecundus* Fern. in RHODORA, XXX. 225 (1928), of Anticosti, a plant which has all the technical characters of *S. gaspensis* Greenm., to which it must be transferred.

S. PAUPERCULUS Michx., var. **neoscoticus,** var. nov. (TAB. 806), planta 1–4 dm. alta; foliis basilaribus indivisis 1.5–6.5 cm. longis 1–2 cm. latis; foliis caulinis imis plus minusve pinnatifidis 3.5–6.5 cm. longis 0.7–2 cm. latis; capitulis 2–25, longe pedicellatis; involucris 4–5 mm. altis basin versus persistenter tomentosis; achaeniis glabris 2 mm. longis.—NOVA SCOTIA: talus of gypsum cliffs, Five-mile River, Hants County, July 19, 1920, *Pease & Long*, no. 22,914 (TYPE in Herb. Gray.), distrib, as var. *Balsamitae* (Muhl.) Fern.; common on gypsum, Antigonish Harbour, July 11, 1941, *A. E. Roland*, no. 41,741, distrib. as var. *Balsa-*

[1] NOTE ON THE TERM PHYLLARY.—The term PHYLLARY, now largely used instead of involucral bract, is given by Jackson, Gloss. Bot. Terms, as coming from a Latin word "*phyllaris*", with the result that those of us who have depended upon Jackson have, naturally, made an ablative plural "phyllaribus". Bentham & Hooker and other English phytographers had used the term as later defined in the Century Dictionary and as originally adopted in this country by Blake, from the New Latin PHYLLARIUM. This is preferred to Jackson's nominative.

mitae; rock-faces and crevices of gypsum cliffs, Port Bevis, Victoria County, August 27, 1920, *Fernald & Long*, no. 22,915, also distrib. as var. *Balsamitae.* QUEBEC: gravelly bank near Percé, Gaspé County, July 14, 1928, *Pease*, no. 20,177.

Var. *neoscoticus* is the only variation of the plastic *Senecio pauperculus* (PLATE 804) known to me from Nova Scotia. It superficially resembles var. *Balsamitae* (PLATE 805) in having well developed lower cauline leaves, but it is unlike any of the other varieties of the species in having densely and permanently tomentose involucres, in the TYPE the tomentum at the base of the involucre or, in some plants, extending to the tips of the phyllaries. The conventional and not too convincing distinction between *S. plattensis* Nutt. (1841) and *S. pauperculus* Michx. (1803) is the occurrence somewhere on the former (on stem, petioles, pedicels or involucre or on two or more of the areas at the same time) of more or less persistent tomentum, while *S. pauperculus* is glabrate or merely with flocculent tufts of tomentum. Furthermore, to quote Greenman, the former species has "achenes usually hispidulous along the angles, sometimes glabrous". In *S. pauperculus* we get "achenes glabrous or hirtellous along the angles". That leaves mighty little which seems specific. Nevertheless, of many scores of mature collections of *S. plattensis* which I have studied essentially all have hispidulous achenes. Of more than 200 members of the inclusive *S. pauperculus* examined all but 3 numbers have shown glabrous achenes. I am not ready to reduce *S. plattensis*, without field-acquaintance with it. But in its densely tomentose involucre *S. pauperculus*, var. *neoscoticus* might be looked upon as a connecting link. In all other characters, however, it is good *S. pauperculus.*

A southeastern variety, *Senecio pauperculus*, var. *praelongus* (Greenm.) House, found from eastern Massachusetts to Michigan, south to Connecticut, Maryland and the upland of Virginia, is strikingly similar to and has often been mistaken for the ubiquitous southern *S. Smallii* Britton. In New England, New York and Michigan it passes into *S. pauperculus* var. *Balsamitae*, while in the elongate cauline and basal leaves and the numerous heads it looks like *S. Smallii.* The latter, however, usually has copiously hispidulous achenes only 1.5–2.2 mm. long, the former glabrous achenes 2–2.5 mm. long. There seems to be a recog-

nizable difference in the phyllaries. In *S. pauperculus* they are linear-attenuate, gradually tapering from the base; in *S. Smallii* they are more definitely linear-oblong, with parallel sides, and tapering only toward the summit. In typical *S. pauperculus* and its var. *Balsamitae* (Muhl.) Fern., furthermore, the more or less elongate rhizome is commonly prostrate, with decumbent branches. In *S. Smallii* the short rhizome has crowded erect crowns. The photograph of the TYPE of *S. Balsamitae* Muhl. ex Willd. sent me by Professor Diels is of the northern few-leaved plant. I am clinging to these characters for what they may be worth.

Far to the northeast there is a series of plants of this affinity, growing from western Newfoundland to Anticosti, thence to northern Maine, which differs from *Senecio pauperculus* in usually broader and heavier foliage, the basal leaves tending to be elliptic or oval but sometimes oblanceolate, the disk very broad. These are the two extremes which were described as *S. gaspensis* Greenm. in Ann. Mo. Bot. Gard. iii. 138 (1916) and as *S. Balsamitae* var. *firmifolius* Greemn. in RHODORA, vii. 244 (1905) or *S. pauperculus* var. *firmifolius* (Greenm.) Greenm. in Ann. Mo. Bot. Gard. iii. 166 (1916). In their extremes the two are very different, but some of the larger specimens cited by Greenman as var. *firmifolius* are inseparable from smaller ones determined or cited by him under *S. gaspensis*. Typical *S. gaspensis* differs still further from *S. pauperculus* in having the undivided basal leaves broader (1.5–4.5 cm. broad, the basal leaves of *S. pauperculus* ranging from 0.5–2 cm. broad). Furthermore, in both typical *S. gaspensis* and in *S. pauperculus* var. *firmifolius* the phyllaries are linear-oblong, with parallel (instead of gradually converging) sides, tapering only near the tip. This apparently fairly definite species also includes the discoid form of Anticosti which, before I had spent two weeks upon the group, I placed under *S. pauperculus*. As I understand the plants I should now treat them as follows.

S. GASPENSIS Greenman in Ann. Mo. Bot. Gard. iii. 188 (1916). Stem 2–6 dm. high; undivided basal leaves with the larger blades 3.5–8 cm. long and 1.5–4.5 cm. broad; flowering stem very leafy; larger cauline leaves 5–12 cm. long, 1–3 cm. broad, chiefly pinnatifid only below the middle; pedicels mostly 2–10 cm. long; glabrous achenes 2.5–3 mm. long.—Bottomlands, damp shores,

swamps and calcareous cliffs, Anticosti Island and Gaspé Peninsula, Quebec, to upper St. John River, Maine (where apparently crossing with *S. pauperculus*, var. *Balsamitae*).

Forma **verecundus** (Fern.), comb. nov. *S. pauperculus*, forma *verecundus* Fernald in Rhodora, xxx. 225 (1928).—Swamps, flats and calcareous talus, Anticosti Island.

With the recognition of *Senecio gaspensis*, the discoid form from Anticosti, of which I now have several numbers, finds its place there.

Var. **firmifolius** (Greenm.), comb. nov. *S. Balsamitae*, var. *firmifolius* Greenm. in Rhodora, vii. 244 (1905). *S. pauperculus*, var. *firmifolius* Greenm. in Ann. Mo. Bot. Gard. iii. 166 (1916).—Stems 0.2–2 dm. high, stiffly erect, often much tufted; undivided basal blades 1–8 cm. long, 0.7–2.5 cm. broad; flowering stem nearly naked except at base or with greatly reduced leaves 1–3.5 cm. long and rarely 1 cm. broad; pedicels 0.2–5 cm. long; achenes 2.4–2.6 mm. long.—Dry calcareous rock, shingle and talus, western Newfoundland; Côte Nord (Betchouane), Anticosti and Gaspé Peninsula, Quebec.

With *Senecio pauperculus*, *S. Smallii*, *S. gaspensis* and, perhaps, *S. plattensis* showing possibly more recognizable characters than they have usually been accorded, there remains the local *S. Crawfordii* Britton. This local species has linear-attenuate phyllaries somewhat as in *S. pauperculus* and its varieties, few large heads and the well developed basal leaves on very prolonged petioles, so that the typical lower blades are only one fifth to one third as long as the erect petioles. The elongation of petiole was probably induced by its often paludal habitat. A most significant character seems to have been overlooked. In *S. pauperculus* and *S. gaspensis* there is a more or less elongate and creeping or decumbent rhizome, from which spring leafy tufts independent of the flowering stem (snatched or merely jerked-up specimens rarely show good rhizomes). In all the material of *S. Crawfordii* I have seen the rhizome is reduced to a short vertical or ascending crown which is praemorse and not creeping. When Mr. Long and I collected in Surry County, Virginia, a few leaf-specimens which we mistook for *S. Crawfordii*, we did not have the rhizome in mind. Our Surry County material (no. 12,892), reported under that name, has a strongly developed horizontal rhizome. It seems to belong with a series collected by Mr. Long, Dr. E. C. Abbe and me, also in Surry County (*Fernald, Long & Abbe*, no.

14,245) which is an unquestioned hybrid of *S. aureus* L. and *S. tomentosus* Michx., the series occurring with the two parents and combining their characters.

Returning to *Senecio Crawfordii*, the short praemorse crown-like rhizome, the very long petioles and the other characters above noted clearly mark it. Although local, the species has a broader range than usually assigned it. I am quite incapable of separating from it the TYPE from Indiana of *S. obovatus*, var. *umbratilis* Greenm. in Ann. Mo. Bot. Gard. iii. 115 (1916). It has the short praemorse erect rhizome, the long-petioled elliptic-oblong basal leaves, the cauline leaves and the heads so nearly identical with isotypic material from Mr. Joseph Crawford himself that the only difference I can see is that the type of *S. obovatus* var. *umbratilis* is in young anthesis, the Crawford material in fruit. Similarly the Tennessee material cited under *S. obovatus* var. *umbratilis* (*S. M. Bain*, no. 421) is so similar to characteristic *S. Crawfordii* from Camden County, New Jersey (*Witmer Stone*), Bristol, Pennsylvania (*Fretz*) and Suitland, Maryland (*Blake*, no. 9391), that it looks as if it were collected with any one of them. Material from open peaty pineland near Middlesex, Nash County, North Carolina, *Godfrey & White*, no. 7017, correctly identified as *S. obovatus*, var. *umbratilis*, is to me inseparable from the Stone, Fretz, Blake and Bain specimens of *S. Crawfordii*, a species which is evidently a southern one reaching a northeastern limit in eastern Pennsylvania and adjacent New Jersey.

Senecio obovatus Muhl. is a stoloniferous plant, with creeping rhizomes derived from the elongate stolons; its obovate to subrotund radical leaf-blades are decurrent into the relatively short and upwardly broadened petioles; its relatively short involucre with few phyllaries abruptly tapering from above the middle. It is very different from *S. Crawfordii*, which is a plant of low grounds (meadows and bogs), whereas *S. obovatus* thrives on calcareous rocky or rich wooded banks; it would be quite unhappy in an acid bog. Not all plants referred in the original account to *S. obovatus* var. *umbratilis* are *S. Crawfordii*, however. Many of them I have not seen, but Bush's no. 1356 from woods, Fulton, Arkansas, is so like a specimen from Williams's Bluff, Knoxville, Tennessee, of the reputedly endemic Knoxville specialty, *S.*

obovatus var. *diversifolius* Greenm. that I can find no difference. The latter very luxuriant series is rather closely approached by overgrown individuals as far away from Knoxville as New England. It seems like overgrowth in unusually favorable conditions.

S. OBOVATUS Muhl., var. **Elliottii** (Torr. & Gray), stat. nov. *S. Elliottii* Torr. & Gray, Fl. N. Am. ii. 443 (1843).

Typical *Senecio obovatus* and its var. *rotundus* Britton are slender and glabrous or promptly glabrescent plants. From the mountains of eastern West Virginia to Alabama and northwestern Florida var. *Elliottii* stands off as a stout plant, with the stems, petioles, often the lower leaf-surfaces and the short pedicels at first arachnoid-tomentose. The radical leaves are more coriaceous than in typical *S. obovatus*, the upwardly dilated petiole obsolete or very short. This is *S. Elliottii* as described by Torrey & Gray, with stem "floccose-woolly when quite young. Radical leaves . . . 2–3 inches in diameter, frequently coriaceous . . . the winged petiole . . . much shorter than the lamina", etc. Torrey & Gray, describing this plant of Georgia, Florida and Alabama, supposed it to be the *S. obovatus* of Elliott, Sketch, ii. 329; but Elliott, describing the plant found on the Santee River, distinctly said "*Stem* . . . glabrous. *Leaves* . . . glabrous," etc. There is certainly doubt whether Elliott had the coarse and pubescent plant of the upland.

The following are characteristic specimens of var. *Elliottii*. WEST VIRGINIA: shaly bank south of Great Capapon, Morgan County, *Pease*, no. 26,587; Milton, Cabell County, *Louis Williams*, no. 309. SOUTH CAROLINA: slopes of Paris Mt., Greenville, *Mackenzie*, no. 2986. FLORIDA: calcareous woods, near Mariana, Jackson County, *Harper*, nos. 53 and 3003. ALABAMA: chalky ravine near Epes, Sumter County, *Harper*, nos. 3001, 3005 and 3159.

*S. PLATTENSIS Nutt. *S. pseudo-tomentosus* Mackenz. & Bush in Trans. Acad. Sci. St. Louis, xii. 88, pl. xvii (1902).—Western Virginia: FREDERICK COUNTY: limestone ledges, Cedar Creek, *Hunnewell*, no. 12,445. SHENANDOAH COUNTY: limestone barrens, Strasburg, *Hunnewell*, no. 14,469; old field 1 mile north of Strasburg, *Allard*, no. 103, as *S. tomentosus*. ROANOKE COUNTY: limestones or dolomites, either wooded or cleared, along Roanoke River, Dixie Caverns, *C. E. Wood, Jr.*, nos. 3387, 3392, 3670, 3687, 3689, 3693, 3694, 5786–5797; steep shaly slope, with limestone ledges, partly wooded, along Roanoke River south-southwest of Wabun, *Wood*, no. 5103.

Although Greenman cites *Senecio plattensis* as extending eastward only to southern Ontario, Michigan, Indiana, Missouri, Arkansas and Louisiana, it has several times been collected in Ohio; and on July 2, 1907, Messrs. W. W. Eggleston, R. W. Woodward and C. A. Weatherby collected very characteristic material of it on limestone cliffs at North Pownal, Vermont, in a general region (southwestern Bennington County) notable for the isolation of more western species, such as *Carex Richardsonii* R. Br. (see Fernald in Rhodora, xxxiv. 229) and *Collinsia parviflora* Dougl. (see Weatherby in Rhodora, xxxvii. 422). Very characteristic *S. plattensis* (including *S. pseudo-tomentosus*) was collected on limestone ledges in Frederick County, Virginia, in 1932 by Hunnewell and soon thereafter by himself and independently by Allard near Strasburg in Shenandoah County. These specimens are inseparable, so far as I can detect, from the Vermont plant and from much *S. plattensis* from Ontario, Ohio, Michigan, Indiana, Wisconsin, Illinois and Missouri, thence westward to the Dakotas, Nebraska, Kansas, etc. They come from more or less open or exposed habitats. Mr. Wood's extensive series from along the Roanoke River is mostly from woods, bluffs and slopes. On the whole it is greener, thinner-leaved and with greater tendency to low forking of the inflorescence, but I am quite incapable of finding any morphological characters to separate it. It is smaller-headed than in some *S. plattensis* but not all, and its low-forking inflorescence and its excessive development of pinnatifid cauline leaves are readily matched in material from Ohio, Indiana, Wisconsin, Illinois, Minnesota, Missouri, Arkansas, etc. It seems to be a shade-state rather than a definite variety. In fact the numbers from less shaded habitats have thicker leaves.

In plate 800, fig. 1 shows the type (from Clayton) of Senecio aureus L.; fig. 2, an achene, × 10, from Great Neck, Princess Anne County, Virginia, *Fernald & Griscom*, no. 4517. Fig. 3, achene, × 10, of S. tomentosus from Buckroe, Virginia, *B. L. Robinson*, no. 410.

Plate 801, S. aureus: fig. 1, base, × 1, from Great Neck, Princess Anne County, Virginia, *Fernald & Griscom*, no. 4517; fig. 2, portion of mature basal leaf, × 1, from west of Claremont, Virginia, *Fernald & Long*, no. 12,893; fig. 3, unexpanded basal leaf, × 2, from Garysville, Prince George County, Virginia, *Fernald & Long*, no. 7984; fig. 4, portion of unexpanded corymb, × 2, from no. 7984; fig. 5, involucre, × 5, from western slope of Bull Run Mountains, Fauquier County, Virginia, *Allard*, no. 4540.

Plate 802, S. aureus, var. intercursus, n. var., all figs. from type: fig. 1, base, × 1; fig. 2, foliage, × 1; fig. 3, corymb, × 1; fig. 4, involucre, × 5.

PLATE 803, S. AUREUS, var. AQUILONIUS, n. var., all FIGS. × 1, from TYPE: FIG. 1, base; FIG. 2, basal leaves; FIG. 3, cauline leaves; FIG. 4, corymb.

PLATE 804, S. PAUPERCULUS Michx.: FIG. 1, TYPE, × ¾, original photograph by the author; FIGS. 2 and 3, exceptionally tall plant, × 1, from wet peat, Port aux Basques, Newfoundland, *Fernald, Long & Dunbar,* no. 27,160; FIG. 4, basal tuft, × 1, from no. 27,160.

PLATE 805, S. PAUPERCULUS, var. BALSAMITAE (Muhl. ex Willd.) Fern.: FIG. 1, one of the two plants of type-sheet, × ¾, courtesy of Professor *Diels;* FIGS. 2 and 3, flowering stem, × 1, from near Mt. Hope, Lancaster County, Pennsylvania, June 5, 1900, *Heller;* FIG. 4, basal tuft, × 1, from same collection; FIG. 5, involucre, × 5, from same collection.

PLATE 806, S. PAUPERCULUS, var. NEOSCOTICUS, n. var., all figs. from TYPE: FIGS. 1 and 2, a single plant, × 1; FIG. 3, involucre and pedicel, × 5.

*CIRSIUM VIRGINIANUM (L.) Michx., forma **revolutum** (Small), stat. nov. *Carduus revolutus* Small, Fl. Se. U. S. 1307 and 1341 (1903). *Cirsium revolutum* (Small) Petrak in Beiheft. Bot. Centralbl. xxxv. Ab. 2: 558 (1927). SUSSEX COUNTY: exsiccated argillaceous pineland about 2 miles east of Stony Creek, no. 9223.

Most certainly *Cirsium revolutum* is not a distinct species. In all characters it is like *C. virginianum* except that its lower and median cauline leaves are broader and deeply pinnatifid. Typical *C. virginianum* (as shown by a photograph of the type as well as by the original description) has the very numerous cauline leaves lance-acuminate, the lower and median ones only 0.5–1.5 cm. wide, entire or with remote, divergent, short, subulate prickles. This plant occurs in wet pineland or sphagnous or peaty bogs, swales and clearings, mostly on the Coastal Plain, from Florida to New Jersey. In forma *revolutum*, which has the same broad range, from Florida to New Jersey, the lower and median cauline leaves are 1.5–4 cm. broad and deeply pinnatifid, with lanceolate to narrowly triangular simple or forked or toothed long-pointed lobes, while the reduced upper leaves may be similar, though smaller, or quite like those of typical *C. virginianum.* The two forms seem to occur in somewhat pure stands so that all of a single station are more or less uniform. Forma *revolutum* is worthy that much recognition but surely it is not a distinct species.

Cirsium virginianum is generally supposed to extend westward to Texas, thence northward to southern Ohio, southern Indiana and southern Missouri. The plant of the Interior, however, is *C. flaccidum* Small, although its author missed some of its most important characters and restricted it to "Low pinelands, Coastal Plain, Fla. to N. C.," while the plant of the Interior

was left in *C. virginianum*. True *C. virginianum* has tuberous-thickened first year's roots (a character rarely shown in the herbarium), *C. flaccidum* slender root-fibers; *C. virginianum* has very numerous (40–70 or more) firm or coriaceous cauline leaves, *C. flaccidum* few (10–20) thin and flexible ones. In *C. virginianum* the peduncle-like flowering branches have several bracteiform leaves, in *C. flaccidum* the peduncles are naked or with only 1 or 2 bracts; in *C. virginianum* the involucre is 1.5–3 cm. high, in *C. flaccidum* only up to 2 cm. high. *C. virginianum*, of savannahs, bogs and wet pinelands of the Coastal Plain from Florida to New Jersey, flowers from mid-August to October. *C. flaccidum* of dry, acid woods, thickets and ravines, from Georgia (Small says North Carolina) and northern Florida to Texas, north to southern Ohio, southern Indiana and southern Missouri, flowers in May and June, sometimes in April.

The following taken from the Carolina and Virginia sheets in the Gray Herbarium of *Cirsium virginianum*, give, in corroboration, the habitats and flowering dates: sphagnous bog, Sept. 13; boggy depression, Oct. 18; low woods, Oct. 15; open pine and oak woods, Sept. 18; clearing, Aug. 19 (first flowers); damp pineland, Sept.; bog or savannah, Sept. 10; exsiccated argillaceous pineland, Aug. 24; pineland, Aug. 28 (first flowers); savannah, Oct. 13; pineland, Oct. 13 and Aug. 29 (first flowers); savannah, Sept. 1; sphagnous bog, Sept. 10; bog or savannah, Sept. 10 and 11. Average date September 15. All material in the Gray Herbarium of *Cirsium flaccidum* with sufficient data gives the following result: dry woods, Lookout Mountain, northern Georgia, June 4; woods near Chattanooga, Tennessee, May 23; dry woods, Talledega Co., Alabama, May 22; head of deep ravine, with *Kalmia latifolia*, Perry County, Indiana, June 4; upland woods, Polk County, Texas, May 23; dry bank, Houston, Texas, April 18. Average date May 23. Such data, associated with the different roots, many and firm or few and pliable leaves, bracted or nearly naked peduncles, etc., are decisive.[1]

[1] Sir John Hill in 1765 separated the boreal genus *Oxyria* from *Rumex*. Somewhat later Sir James Edward Smith, obviously with his own views of the general soundness of Hill's work, wrote (the reference kindly given me by Dr. Blake): "Sir John Hill, it seems, first separated this plant from *Rumex*, and gave it the above generic name. Sometimes, as Linnaeus says, a blind hen meets with a grain of corn."—Sm. Engl. Bot. ii. 189 (1828). Small had a good species but he did not know its best characters nor its range.

*Hieracium venosum L., var. nudicaule (Michx.) Farwell. For discussion see Fernald in Rhodora, xlv. 323 (1943). The only Virginian material I have seen is from the slopes of Bull Run Mountains, Prince William County, *Allard*, no. 647 and 3321. The plant of the Tidewater region is typical *H. venosum*.

INDEX

New scientific names are printed in full-face type

Acer, 364; floridanum, 363, 379, 453
Acerates viridiflora, 458, var. lanceolata, 458
Aesculus discolor, 383, 453; neglectus, var. pubescens, 383, 453
Allies in eastern North America, Senecio aureus and its Geographic Varieties and, 495–509, pls. 800–806
Amianthium Muscaetoxicum, 369, 374, 393
Amsonia Tabernaemontana, 380, 457
Amygdalus, 451
Andropogon, 389; scoparius, 377, 390, var. genuinus, f. **calvescens, 390,** var. villosissimus, 390; virginicus, var. glaucopsis, 461
Apple, 450, 451
Arabis laevigata, 358
Aronia, 451
Arundinaria gigantea, 461
Asarum, 374, 381–383, 399, § Heterotropa, 374, 399, 400; arifolium, 398, 399; canadense, 398, 399; **Lewisii, 398**–400, **pls. 774, 775;** Ruthii, 398, 399; Shuttleworthii, 400; virginicum, 399, 400
Asclepias lanceolata, var. paupercula, 368, 458, 461, var. paupercula, f. **flaviflora, 458**
Asimina parviflora, 370, 412
Aster, 361, 485; Elliottii, 461; luteus alatus, 487, 495, pl. 797
Azalea, 451

Bastard Sun-flower, 486
Beech, 377
Boltonia caroliniana, 379, 478
Buckeye, 383
Bulbostylis ciliatifolius, 369, 390
Burgrass, 387, The common northern, 387

Cabomba caroliniana, 368, 400
Calopogon pallidus, 369, 398
Cardamine bulbosa, 359; Douglassii, 360
Carduus revolutus, 509
Carex Bayardi, 367, 393; Collinsii, 366, 367, 393; decomposita, 373, 393; Richardsonii, 508; venusta, 367, 393; virginiana, 393
Cenchrus, 388; carolinianus, 387; echinatus, 387, 388, f. longispinus, 388; incertus, 387, 388; **longispinus, 388;** pauciflorus, 387, 388; tribuloides, 387
Cephalanthus, 371, 380
Cerastium, 358; brachypetalum, 358, 359, 400; tetrandrum, 359
Cerasus, 451
Cherry, 451
Chrysanthemum, 485
Cirsium flaccidum, 509, 510; revolutum, 509; virginianum, 365, 509, 510, f. **revolutum, 509**
Cladium jamaicense, 461
Clematis, 401; § Viorna, 405, sub-§ Integrifoliae, 366, 401, 410; albicoma, 402–409, 412, pl. 779, **var. coactilis,** 406, **407,** 409, 410, 412, **pl. 780;** crispa, 359; Fremontii, 410–412, pls. 781, 782, var. Riehlii, 411, 412, pl. 782; integrifolia, 410, 412, pl. 778; ochroleuca, 366, 401–410, 412, pls. 776, 777, and Allies, Morphological Differentiation of, 401, pls. 776–782, [var.] ovata, 401, var. ovata, 408, [var.] sericea, 402, 409, var. sericea, 406–409; ovata, 408, 409, 412; sericea, 406, 409, 410, 412, pl. 777; Viorna, 405; viticaulis, 402–409, 412, pl. 778
Collinsia parviflora, 508
Commelina diffusa, 377, 393
Common northern Burgrass, The, 387
Corydalis flavula, 358, 383, 412
Crabapples, 360
Cuscuta, 368
Cyanococcus, 451
Cynoctonum sessilifolium, 374–376, 457
Cyperus, 451; densicaespitosus, 377; × Weatherbianus, 451

Danthonia compressa, 376, 385; spicata, var. longipila, 385
Decodon, 380
Digitaria serotina, 371, 385
Dracocephalum denticulatum, 461
Drosera, 372; capillaris, 372, 413; rotundifolia, 371, 412
Dwarf Trillium of Southeastern Virginia, The, 396, pls. 772, 773

Eleocharis microcarpa, 372
Elychrysum foliis oblongis etc., 478
Erigeron, 361; philadelphicus, 361; scaturicola, 361; strigosus, f. discoideus, 478

Eriophorum virginicum, 405
Eryngium, 373–375, 381; prostratum, 373, 454
Eulalia, 389; aurea, 389; viminea, 389, var. variabilis, 389
Eupatorium, 371; cuneifolium, 461; pubescens, 478; recurvans, 461; rotundifolium, 369, 478, var. **cordigerum, 477,** 478, var. ovatum, 478
Euphorbia corollata, 370, var. paniculata, 453; Ipecacuanhae, 370; marilandica, 370

Fern, Royal, 396; Sensitive, 396
Fly-poison, 374
Fumaria officinalis, 412

Gentiana cherokeensis, 365, 366
Geographic Varieties and Allies in eastern North America, Senecio aureus and its, 495–509, pls. 800–806
Glycyrrhiza lepidota, var. glutinosa, 378, 453
Gnaphalium americanum, 479; obtusifolium, var. Helleri, 380, 480, var. micradenium, 380, 480; (§ Gamochaeta) **peregrinum, 479, pl. 795;** platense, 479; purpureum, 479; spathulatum, 478, 479, a later Homonym, 478, pl. 795; spatulatum, 478
Goldenrod, 377
Gramineae, 389
Gratiola virginiana, var. aestuariorum, 380, 476

Hamamelis virginiana, 450, var. parvifolia, 450
Helenia, 485; autumnalis, 490; decurrens, 490; foliis decurrentibus, etc., 485, 495, pl. 797
Heleniastrum, 485; folio breviore, etc., 486; folio longiore, etc., 486, 487
Helenium, 379, 485, 490; Some Varieties and Species of, 485–495, pls. 796–799; altissimum, 490; autumnale, 485–492, 495, pl. 796, var. β., 489, var. canaliculatum, 488, 490, 492, 495, pl. 797, var. grandiflorum, 489, 491, var. **montanum, 491,** 492, var. **parviflorum,** 490, **492,** 495, pl. 798, var. pubescens, 491; autumnale pubescens, 491, 492; canaliculatum, 487, 488, 490, 491, 495, pl. 797; **floridanum, 494,** 495, **pl. 799; Godfreyi, 494,** 495, **pl. 799;** grandiflorum, 491; huronense, 491; latifolium, 486, 488, 490; longifolium, 488, 491, 492; montanum, 491; nudiflorum, 493–495, pl. 799; parviflorum, 489, 492, 493, 495, pl. 798; polyphyllum, 493, 494; pubescens, 490, 492; pumilum, 490; quadridentatum, 487
Helianthus angustifolius, 365
Helichrysum crispum, 479; spatulatum, 479
Henbit, 382
Heuchera villosa, 448
Hexastylis, 374, 399
Hickory, 377
Hieracium venosum, 511, var. nudicaule, 511
Holosteum umbellatum, 359, 400
Hydrolea quadrivalvis, 377, 359
Hypericum denticulatum, var. ovalifolium, 373, 453; setosum, 374–376, 453

Ilex coriacea, 461; vomitoria, 461
Iris, 360; verna, 360, 362, 363, pl. 770
Ischaemum, 389

Jacobaea virginiana, 495

Kalmia latifolia, 382, 510
Kuhnia eupatorioides, 376

Lady-fern, 396
Lamium, 382
Lechea, 457
Lepidium virginicum, 382
Leucojum aestivum, 359
Liatris graminifolia, var. Smallii, 478
Licorice, 378
Ligusticum canadense, 378
Lilium canadense, 394, 395, pl. 771, var. **editorum, 393**–395, **pl. 771;** canadense, f. rubrum, 394; michiganense, 394, 395; superbum, 395
Limnobium Spongia, 461
Linaria canadensis, f. **albina, 476**
Lobelia elongata, 461; glandulifera, 377, 477; siphilitica, 477, f. **laevicalyx, 476**
Long-leaf Pine, 369, 374–376
Ludwigia alata, 461; pilosa, 461

Malus, 450, 451; angustifolia, var. puberula, 450; Halliana, 451
Medeola, 396
Micranthemum umbrosum, 367
Monotropsis, 364; odorata, 363
Morphological Differentiation of Cle-

matis ochroleuca and Allies, 401, pls. 776–782
Muhlenbergia, 379; brachyphylla, 365, 366, 380; frondosa, 379; glabriflora, 379, 385
Myosotis verna, 459

Narcissus biflorus, 398
Nemophila microcalyx, 383, 459
Note on the Term Phyllary, 501
Nothoscordum bivalve, 360, 364, 393
Nymphaea odorata, f. rubra, 400

Oak, 377
Oenothera, 366; tetragona, var. riparia, 366, 454
Oldenlandia, 372; Boscii, 371, 372, 476
Oplismenus, 389
Oxyria, 510

Panicum, 369, 372, 381; aciculare, 376, 386; auburne, 386; ensifolium, 386; flexile, 378, 386; longifolium, var. pubescens, 381, 386; lucidum, 376; mundum, 386; sphaerocarpon, var. inflatum, 386; spretum, 372; tenue, 386; Wrightianum, 371, 372, 386
Paronychia canadensis, 400; riparia, 370, 400
Paspalum dissectum, 386, 372; fluitans, 377, 386
Pears, 450, 451
Peppergrass, 382
Phacelia dubia, 383, 459
Philadelphus inodorus, 358, 450
Phlox carolina, var. triflora, 365, 459; Hentzii, 383, 459; nivalis, 383, 459
Phyllary, Note on the Term, 502
Physalis monticola, 370, 476
Physostegia, 368; **aboriginorum, 459**–461, 464, **pl. 783; angustifolia, 462,** 464, **pl. 785;** denticulata, 368, 460–464, pl. 784; granulosa, 463, 464, pl. 786; intermedia, 462; leptophylla, 460; purpurea, 461; speciosa, 462; veroniciformis, 460; virginiana, 462, 463, var. **granulosa, 464,** pl. 786, var. speciosa, 463
Phytolacca, 378; americana, 378; decandra, 378
Pine, Long-leaf, 369
Pinus, 452; palustris, 375; serotina, 461
Poke, 378, 379
Pollinia, 389; imberbis, var. genuina, 389, var. Willdenowiana, 389
Polycodium, 451, 456; interius, 456
Polygala sanguinea, 366, 453; Senega, var. latifolia, 378, 453
Polypremum, 457; procumbens, 457
Poncirus trifoliata, 358
Potamogeton epihydrus, var. Nuttallii, 385; × pulcher, 385
Prasium ?purpureum, 461, 462, pl. 785
Proserpinaca intermedia, 373, 454
Prunus, 451
Psoralea, 366; psoralioides, var. eglandulosa, 366, 452
Pycnanthemum pycnanthemoides, var. viridifolium, 476; verticillatum, 475
Pyrola rotundifolia, var. americana, 377, 455
Pyrus, 450, 451; betulaefolia, 451; communis, 451; communis × pyrifolia, 450; × Lecontei, 450; serotina, 451

Quercus, 452

Ranunculus abortivus, var. indivisus, 358, 401; hispidus, 359; parviflorus, 360; Sardous, 401
Rhexia ventricosa, 366, 454
Rhododendron, 451
Rhynchospora, 451; filifolia, 372, 393; perplexa, 372
Royal Fern, 396
Rubus, 374, 384
Ruellia, 370
Rumex, 510

Sagittaria Weatherbiana, 367
Scleria flaccida, 461; oligantha, 366
Scirpus § Schoenoplectus, 390; americanus, 392; chilensis, 391, 392; etuberculatus, 392; maritimus, var. Fernaldi, 393, var. Fernaldi, f. agonus, 393; novae-angliae, 393; Olneyi, 390–392, The Specific Characters of, 390, f. australis, 392; robustus, 392, 393, f. **protrusus, 392;** subterminalis, 390; validus, var. creber, f. megastachyus, 392
Scutellaria serrata, 380, 459
Sedum ternatum, 360
Senecio aureus, 361, 495–500, 506, 508, pls. 800, 801, and its Geographic Varieties and Allies in eastern North America, 495–509, pls. 800–806; aureus × Balsamitae, 500; aureus × tomentosus, 497; aureus, var. Ashei, 497–499, var. **aquilonius,** 497, **500**–502, 509, **pl. 803,** var. aquilonius, f. **ecoronatus, 502,** var. aurantiacus, 499, var. gracilis, 496, 498, 500, var. **intercursus,** 496, 498, **499,** 502,

508, **pl. 802,** var. semicordatus, 496, 500, 502; Balsamitae, 504, var. firmifolius, 504, 505; Crawfordii, 361, 497, 498, 505, 506; Elliottii, 507; gaspensis, 502, 504, 505, var. **firmifolius, 505,** gaspensis, f. **verecundus, 505;** gracilis, 500; obovatus, 506, 507, var. diversifolius, 507, var. **Elliottii, 507,** var. rotundus, 507, var. umbratilis, 506; pauperculus, 503–505, 509, pl. 804, var. Balsamitae, 502–505, 509, pl. 805, var. firmifolius, 504, 505, pauperculus, f. **inornatus, 502,** var. **neoscoticus, 502,** 503, 509, **pl. 806,** var. praelongus, 503, pauperculus, f. verecundus, 502, 505; plattensis, 503, 505, 507, 508; pseudaureus, 496, 500, f. ecoronatus, 502; pseudo-tomentosus, 507, 508; semicordatus, 500; Smallii, 503–505; tomentosus, 361, 497–499, 506–508, pl. 800
Sensitive Fern, 396
Setaria verticillata, 387
Sium, 367; cicutaefolium, 367, 455; floridanum, 368, 454, 455; suave, 367, 454, 455, f. Carsonii, 455, f. fasciculatum, 455
Snowflake, Summer, 359
Solidago, 369, 377; patula, 377, 478; perlonga, 365, 366; salicina, 377, 478
Some Varieties and Species of Helenium, 485–495, pls. 796–799
× Sorbaronia, 451
× Sorbopyrus, 451
Sorbus, 451; aria, 451
Sorghastrum Elliottii, 376, 390
Specific Characters of Scirpus Olneyi, The, 390
Stachys, 369, 473; ambigua, 467, 469, 471–473, 475, pl. 791; arenicola, 471, 474, 475,; aspera, 469, 470, var. glabra, 466; cincinnatensis, 466; Clingmanii, 464; glabra, 466; Grayana, 471; hispida, 465, 466, 469–473; homotricha, 474; hyssopifolia, 467, 471–473, 475, pl. 788, var. ambigua, 471; Nuttallii, 465; palustris, 466, 471–473, 475, pl. 792, var. arenicola, 474, var. homotricha, 467, 471, 472, 474, 475, pl. 793, var. macrocalyx, 474, var. nipigonensis, 474, var. **phaneropoda,** 474, **475, pl. 794,** subsp. pilosa, 473, var. **pilosa, 474;** pilosa, 474, subsp. pilosa, 474; pustulosa, 474; Schweinitzii, 474; scopulorum, 474; sylvatica, 472; tenuifolia, 465–467, 470, 473, 475, pl. 787, var. aspera, 469, var. **hispida,** 466, 467, **469**–472, 475, pl. 790, var. **perlonga, 466,** 467, 475, **pl. 788,** var. **platyphylla,** 466–**468,** 470–472, 475, **pl. 789;** velutina, 471, 474
Stellaria media, var. glaberrima, 360, 400; pubera, 358
Stewartia Malachodendron, 461
Styrax americana, 372, 457
Summer Snowflake, 359
Sun-flower, Bastard, 486
Symplocarpus foetidus, 358

Teesdalia nudicaulis, 359
Tephrosia, 369; holosericea, 452; virginiana, 369, 452, var. glabra, 369, 452, var. holosericea, 452
Thalictrum revolutum, 365
Therorhodion, 451
Tiarella, 379, 380; cordifolia, 380, 446–449, var. austrina, 446, subsp. collina, 445, var. collina, 445–448, var. typica, 446–448, var. typica, f. parviflora, 448; Wherryi, 445–449
Trillium 364, 365, 396; lanceolatum, 364, 396–398, pl. 773; of Southeastern Virginia, The Dwarf, 396, pls. 772, 773; pusillum, 364, 396, 397, pl. 772, var. **virginianum, 397,** 398, **pl. 773;** sessile, 384, 396

Ulmus procera, 358, 398
Uncinia, 366
Utricularia, 381; biflora, 373; inflata, 476, var. minor, 371, 372, 476; purpurea, 371, 476; virgatula, 371, 476

Vaccinium, 451; caesium, 456; Elliottii, 370, 456; pallidum, 457; stamineum, 456, var. interius, 456, var. neglectum, 456; Torreyanum, 457; vacillans, 457, var. crinitum, 456; virgatum, 456
Verbena officinalis, 476
Viburnum Rafinesquianum, 365
Vicia caroliniana, 365, 453
Vinca major, 358
Viola cucullata, 358, 453; lanceolata, 454, var. vittata, 373, 454; pensylvanica, 359; striata, 383, 454
Vitis, 374

Wisteria frutescens, 461

Xyris, 371

Zizia Bebbii, 378, 454; trifoliata, 378, 454

PLATES

Photo. E. C. Abbe.

Malicious and falsely Incriminating IRIS VERNA
(see pp. 360, 362 and 363)

Photo. B. G. Schubert.

LILIUM CANADENSE: FIGS. 1 and 2, × 1; Var. EDITORUM: FIGS. 3-5, × 1

Photo. B. G. Schubert.

TRILLIUM PUSILLUM, × 1: FIG. 1, Michaux's TYPE, after photo. by *Cintract;* FIGS. 2 and 3, modern specimens from type-region, FIG. 2 with short anthers, FIG. 3 with long anthers

Photo. B. G. Schubert.

TRILLIUM PUSILLUM var. VIRGINIANUM, TYPE, × 1: FIG. 1 with long anthers. FIG. 2 with short anthers

T. LANCEOLATUM, × 1: FIG. 3, summit of flowering plant

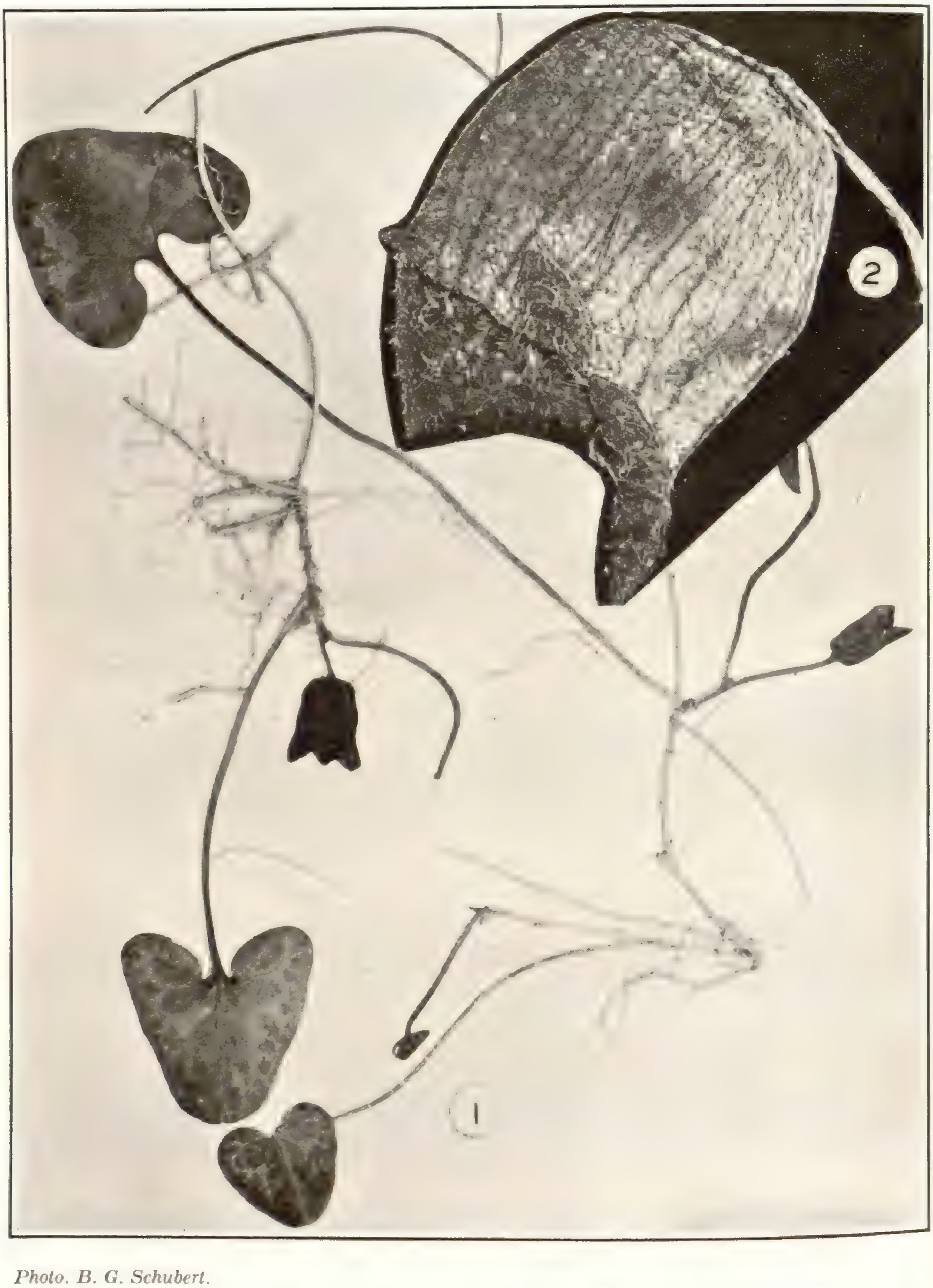


Photo. B. G. Schubert.

ASARUM LEWISII, from TYPE-series: FIG. 1, two plants, × ½; FIG. 2, expanded flower, × 3

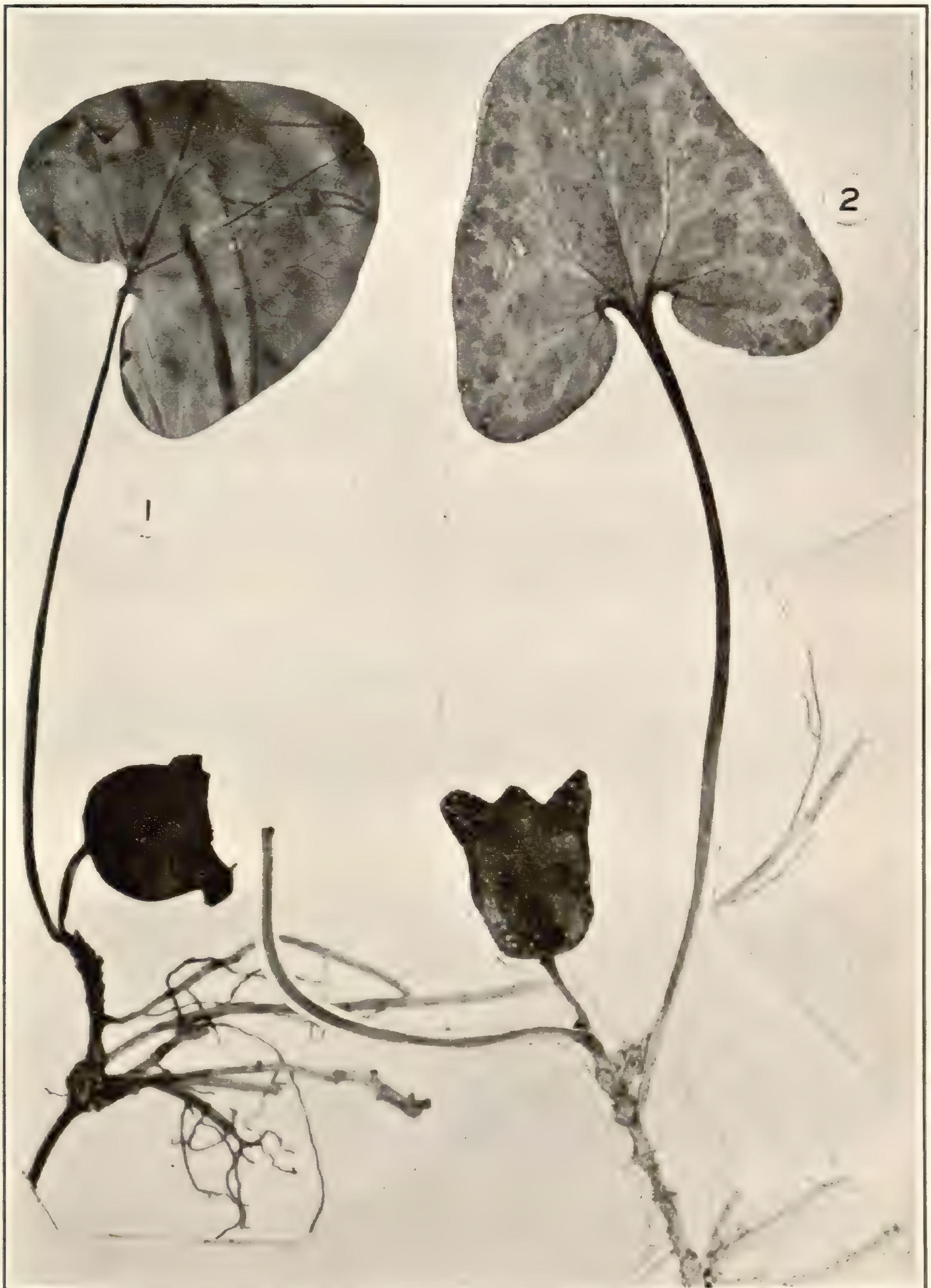


Photo. B. G. Schubert.

ASARUM LEWISII: FIGS. 1 and 2, portions of two flowering plants of TYPE-series, × 1

Photo. B. G. Schubert.

CLEMATIS OCHROLEUCA: FIG. 1, plant, × $^{2}_{5}$, from Staten Island, N. Y., identified by comparison by Asa Gray with type of *C. ovata* Pursh; FIG. 2, lower leaf-surface, × 10; FIG. 3, flower, × 1; FIG. 4, fruiting head, × 1; FIG. 5, achene and base of tail, × 5

Photo. B. G. Schubert.

TYPE of CLEMATIS SERICEA Michx. = C. OCHROLEUCA Ait.: FIG. 1, two plants, × ½; from photograph by *Cintract;* fig. 2 stem, × 2½; FIG. 3, peduncle, × 2½; FIG. 4, tails of fruit, × 2½

Photo. B. G. Schubert.

CLEMATIS VITICAULIS: FIG. 1, topotype, × ½; FIG. 2, back and margin of sepal, × 10; FIG. 3, fruiting head, × 1; FIG. 4, achene and base of tail, × 5

C. INTEGRIFOLIA: FIG. 5, surface of stem × 10; FIG. 6, lower leaf-surface, × 10; fig. 7, flower, × 1; FIG. 8, fruiting head, × 1

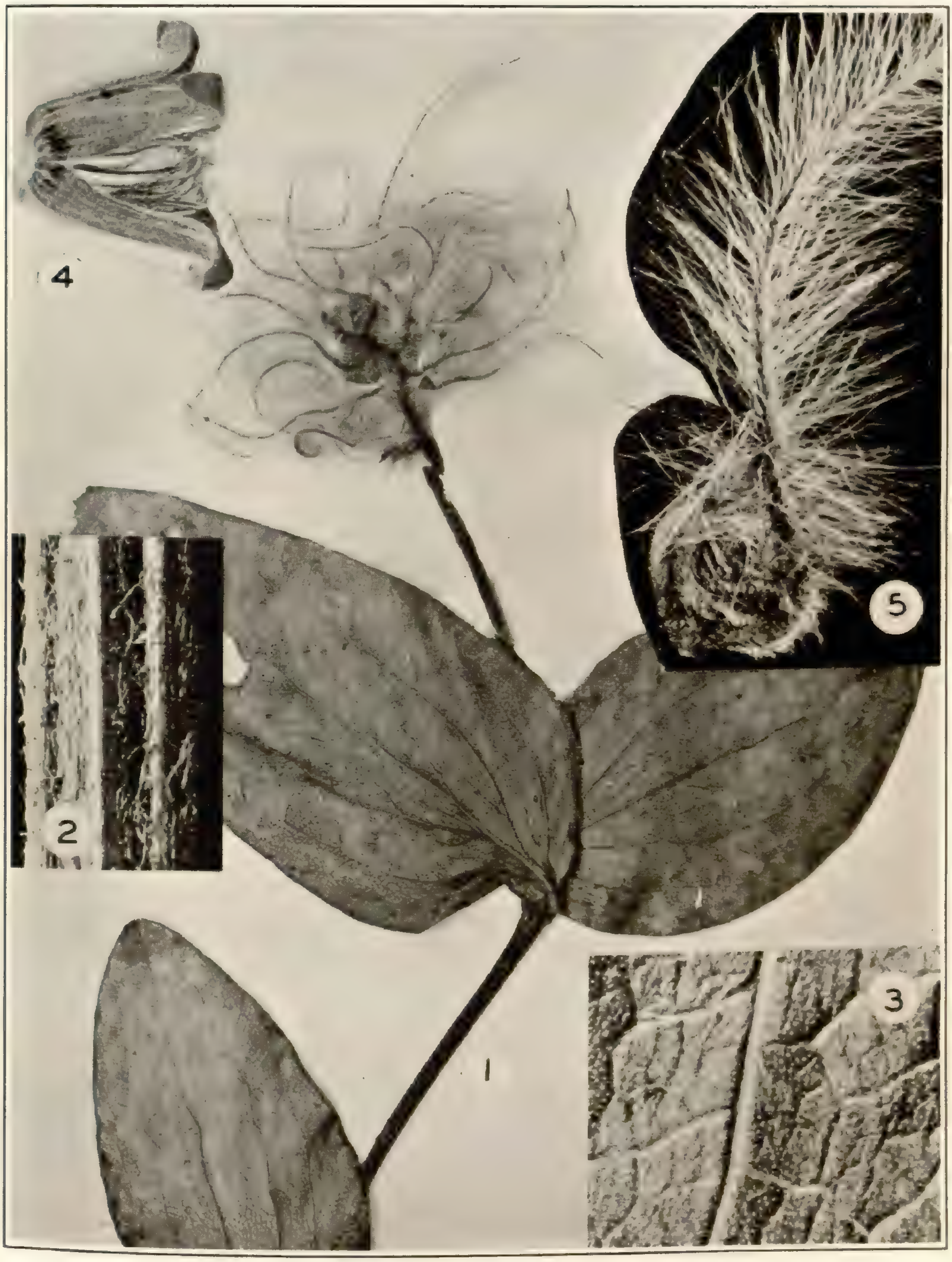


Photo. B. G. Schubert.

CLEMATIS ALBICOMA: FIG. 1, portion of topotype, × 1; FIG. 2, surface of stem, × 10; FIG. 3, lower leaf-surface, × 10; FIG. 4, flower, × 1; FIG. 5, achene and base of tail, × 5

Photo. B. G. Schubert.

CLEMATIS ALBICOMA, var. COACTILIS: FIG. 1, TYPE, × 3/7; FIG. 2, peduncle, × 10; FIG. 3, lower leaf-surface, × 10; FIG. 4, summit of sepal, × 10; FIG. 5, flower, × 1; FIG. 6, fruiting head, × 1; FIG. 7, achene and base of tail, × 10

Photo. B. G. Schubert.

CLEMATIS FREMONTII: FIGS. 1–3, leaves, × 1, from TYPE-series from Ellis, Kansas; FIG. 4, achene and base of tail, × 10

Photo. B. G. Schubert.

CLEMATIS FREMONTII: FIG. 1, upper leaf and flower, × 1, from Ellis, Kansas; FIG. 2, leaf and denuded flower, × 1, of var. *Riehlii* from Allenton, Missouri; FIG. 3, leaf and young fruit. × 1, from Franklin, Missouri, identified by its author as var. *Riehlii*

Photo. B. G. Schubert.

PHYSOSTEGIA ABORIGINORUM, all figs. from TYPE: FIG. 1, plant, × ½; FIG. 2, flower, × 2; FIG. 3, fruiting calices, × 5

Photo. B. G. Schubert.

PHYSOSTEGIA DENTICULATA: FIG. 1, plant, × ⅖
P. INTERMEDIA: FIG. 2, plant, × ½; FIG. 3, leaf-margin, × 2

Photo. B. G. Schubert.

PRASIUM? PURPUREUM Walt.: FIG. 1, leaf, × 1, from tracing by *S. F. Blake*
PHYSOSTEGIA ANGUSTIFOLIA: FIGS. 2–4, *Drummond*, no. 251, × 5/9; FIG. 5, leaf of 251, × 2; FIG. 6, TYPE of species, × 5/12; FIG. 7, portion of leaf, × 2, from TYPE

Photo. B. G. Schubert.

PHYSOSTEGIA VIRGINIANA, var. GRANULOSA: FIG. 1, ISOTYPE, × ½; FIG. 2, portion of leaf of ISOTYPE, × 2; FIG. 3, plants, × ½, from upper Kennebec River, Maine; FIG. 4, leaf, × 2, from the last; FIG. 5, plant, × ½, from Lake Champlain

Photo. B. G. Schubert.

STACHYS TENUIFOLIA: FIG. 1, plant, × ½; FIG. 2, surface of stem, × 10; FIG. 3, lower surface of leaf, × 10; FIG. 4, bracts and flower, × 4

Photo. B. G. Schubert.

STACHYS TENUIFOLIA, var. PERLONGA: FIG. 1, ISOTYPE, × $\frac{2}{5}$; FIG. 2. bracts and calices, × 4

S. HYSSOPIFOLIA: FIG. 3, plant, × $\frac{1}{2}$: FIG. 4, bract and calyx, × 4; FIG. 5, nutlet, × 10

Photo. B. G. Schubert.

STACHYS TENUIFOLIA, var. PLATYPHYLLA: FIG. 1, TYPE, × ⅖; FIG. 2, surface of stem, × 10; FIG. 3, lower surface of leaf, × 10; FIG. 4, rachis, bracts and calices, × 4; FIG. 5, nutlet, × 10

Photo. B. G. Schubert.

STACHYS TENUIFOLIA, VAR. HISPIDA: FIG. 1, plant, × ½; FIG. 2, portion of stem, × 10; FIG. 3, lower surface of leaf, × 10; FIG. 4, rachis, bracts and calices, × 4

Photo. B. G. Schubert.

STACHYS AMBIGUA: FIG. 1, summit of plant, × ½; FIG. 2, portion of stem, × 10; FIG. 3, calices, × 4

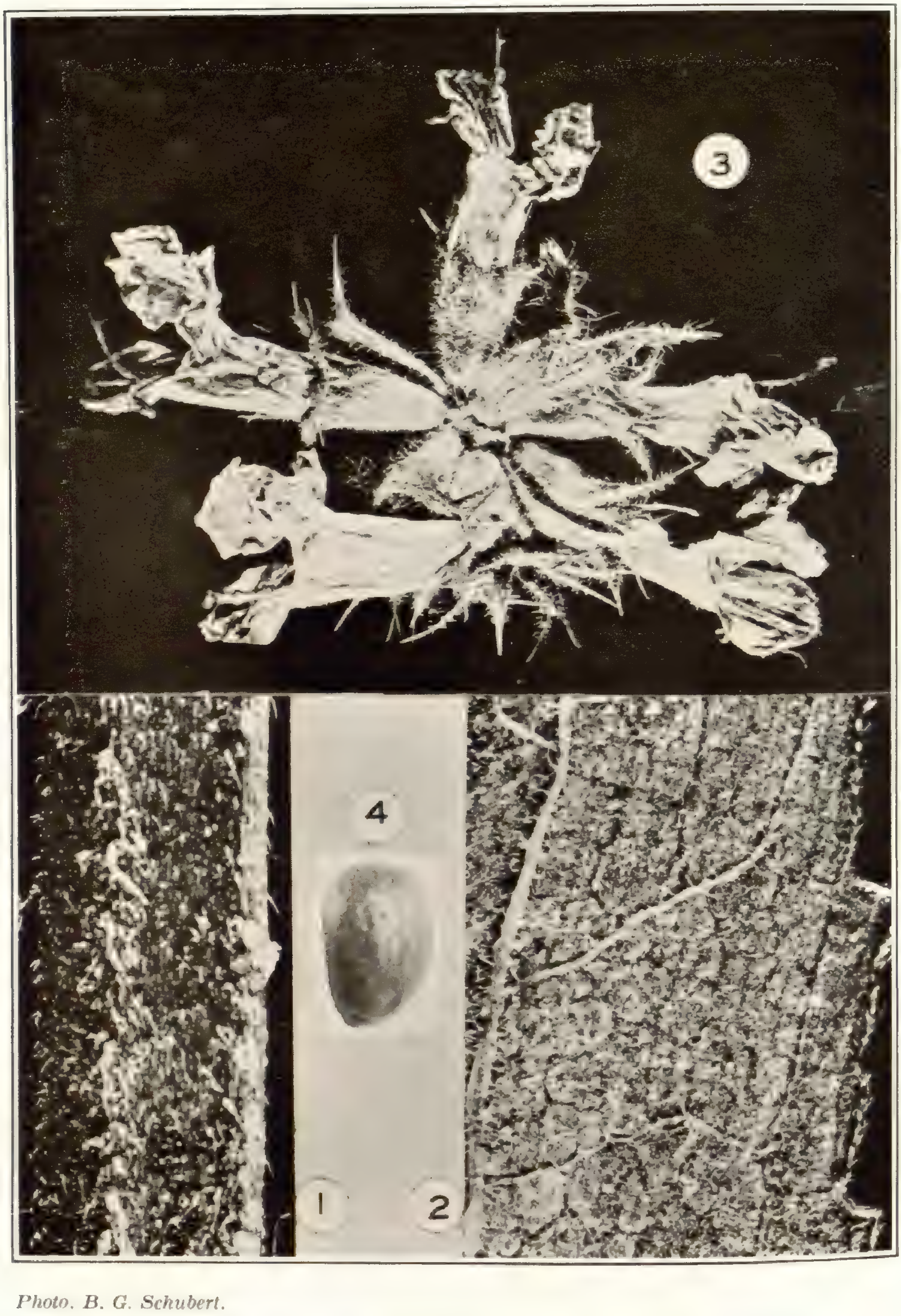


Photo. B. G. Schubert.

STACHYS PALUSTRIS: FIG. 1, portion of stem, × 10; FIG. 2, lower leaf-surface, × 10; FIG. 3, bracts and flowers, × 4; FIG. 4, nutlet, × 10

Photo. B. G. Schubert.

STACHYS PALUSTRIS, var. HOMOTRICHA: FIG. 1, one of TYPE-specimens, × ⅜; FIG. 2, lower bracts and calyx, × 4, from TYPE; FIG. 3, stem and lower surface of leaf-base, × 10, from TYPE; FIG. 4, narrow-leaved plant (*S. arenicola* Britt.), × ½; FIG. 5, calyx of the last, × 10

Photo. B. G. Schubert.

STACHYS PALUSTRIS, var. PHANEROPODA, all figs. from TYPE: FIG. 1, plant × ½; FIG. 2, surface of stem, × 4; FIG. 3, calyx, × 10

Photo. B. G. Schubert.

GNAPHALIUM PEREGRINUM, TYPE, × 2/5

Photo. B. G. Schubert.

HELENIUM AUTUMNALE: FIGS. 1 and 2, portions of TYPE, × 1, from photograph sent from *Linnean Society of London;* FIG. 3, flowering summit, × 1, of modern specimen from Ohio

Photo. B. G. Schubert.

HELENIUM AUTUMNALE, var. CANALICULATUM, all figs. × 1 (except FIG. 5): FIG. 1, portion of plant of Hortus Cliffortianus, courtesy of Dr. *John Ramsbottom;* FIG. 2, summit of wild specimen from Quebec; FIG. 3, portion of original plate of *H. canaliculatum;* FIGS. 4 and 5, portions of Cornut plate

Photo. B. G. Schubert.

HELENIUM AUTUMNALE, var. PARVIFLORUM, both figs. × 1: FIG. 1, portion of TYPE or ISOTYPE of H. PARVIFLORUM Nutt.; FIG. 2, summit of recent specimen from Virginia

Photo. B. G. Schubert.

HELENIUM GODFREYI: FIG. 1, TYPE, × ½; FIG. 2, achene, × 10
H. FLORIDANUM: FIG. 3, portion of TYPE, × 1; FIG. 4, achene, × 10
H. NUDIFLORUM: FIG. 5, achene, × 10

Photo. B. G. Schubert.

SENECIO AUREUS: FIG. 1, portions of TYPE, × 1, from photograph sent from *Linnean Society of London;* FIG. 2, achene, × 10, from Virginia
S. TOMENTOSUS: achene, × 10, from Virginia

Photo. B. G. Schubert.

SENECIO AUREUS, details from modern specimens from Virginia: FIG. 1, rhizome and basal offshoot, × 1; FIG. 2, portion of full-grown basal leaf, × 1; FIG. 3, expanding young basal leaves, showing archnoid pubescence, × 2; FIG. 4, unexpanded heads, showing arachnoid pubescence, × 2; FIG. 5, involucre, × 5

Photo. B. G. Schubert.

SENECIO AUREUS, var. INTERCURSUS, all figs. from TYPE: FIG. 1, rhizome and basal offshoots, × 1; FIG. 2, basal and lower cauline leaves, × 1, FIG. 3, involucre, × 5; FIG. 4, inflorescence, × 1

Photo. B. G. Schubert.

SENECIO AUREUS, var. AQUILONIUS, all figs. × 1, from TYPE: FIG. 1, elongate rhizome and basal offshoot; FIG. 2, basal leaves; FIG. 3, cauline leaves; FIG. 4, inflorescence

Photo. B. G. Schubert.

SENECIO PAUPERCULUS: FIG. 1, TYPE, × ¾, from photograph by *M. L. Fernald;* FIGS. 2–4, unusually tall plants, × 1, from Newfoundland

Photo. B. G. Schubert.

SENECIO PAUPERCULUS, var. BALSAMITAE: FIG. 1, type of S. BALSAMATAE Muhl., × 1, kindness of Professor *Ludwig Diels;* FIGS. 2, 3 and 4, portions of a modern specimen from type-region, × 1; FIG. 5, involucre, × 5, from latter specimen

Photo. B. G. Schubert.

SENECIO PAUPERCULUS, var. NEOSCOTICUS, all figs. from TYPE: FIGS. 1 and 2, base, cauline leaves and inflorescence, × 1; FIG. 3, involucre, × 5

Date Issued

Reprinted from RHODORA, Vol. 46, January and February, 1944

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OVERLOOKED SPECIES, TRANSFERS AND NOVELTIES IN THE FLORA OF EASTERN NORTH AMERICA

M. L. Fernald

(Plates 807–816)

During a restudy of the *Liliaceae* of the Gray's Manual area I was soon confronted by the many species proposed by Rafinesque in one of his relatively careful and trustworthy works, Autikon Botanikon (1840), a book so rare, until the offset of it issued by the Arnold Arboretum, that only casual names from it (and those picked up through other sources) were caught by the editors of Index Kewensis, Dr. Merrill is engaged on a bibliographic study of great extent, dealing with this and other neglected works of Rafinesque. It is, consequently, not appropriate here to go into further detail than to note a few species in Autikon Botanikon which have immediately to be taken into account in my studies. Very soon I found Rafinesque referring to species of Bartram, and on checking Bartram's Travels (1791) the same situation was found: only casual names of species by Bartram were entered in Index Kewensis, these picked up from the writings of others who had cited them. Accordingly, it was necessary to study Bartram's Travels, with such limited knowledge of the flora of the southeastern United States as I have. The present Contribution, therefore, is made up partly of consideration of some of the species of Bartram, some in Rafinesque's

Autikon Botanikon, some based on study of photographs of types of Linnaeus in the *Liliaceae*, and the usual miscellany which has accumulated in recent months. The items are arranged in systematic sequence.

PANICUM (sub-§ LANUGINOSA) **Benneri,** sp. nov. (TAB. 807), planta cespitosa 1.7–3.5 dm. alta; culmis firmis erectis basi 1–1.5 mm. diametro, internodiis ad 7.5 cm. longis pilosis pilis adscendentibus; nodis barbatis; foliis lanceolatis firmis valde adscendentibus glabris vel subtus sparsissime breviterque pilosis 3.5–6.5 cm. longis 5–8 mm. latis 36–42-nerviis basi villoso-ciliatis, vaginis subhorizontaliter hirsutis pilis 1–1.5 mm. longis basi bullatis, ligulis 2–3 mm. longis; paniculis primariis breviter exsertis ellipsoideo-ovoideis 2.5–6 cm. longis 1.5–4 cm. diametro, rhachi imo hirtello sparsissime villosoque, ramis patento-adscendentibus ramulis subsimplicibus, pedicellis 2–6 mm. longis glabris; spiculis pubescentibus ellipsoideis basi apiceque obtusis 2.2–2.6 mm. longis 1.2–1.4 mm. latis, gluma inferiore perbrevi deltoideo-rotundata subapiculata 0.5–0.8 mm. longa, superiore lemmateque sterile aequilongis valde costatis fructus lucidos subaequantibus.—NEW JERSEY: old field along Delaware River, about 1½ miles east of Raven Rock, Hunterdon County, June 7, 1941, *Walter M. Benner*, no. 9635, TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.

By the treatments of Hitchcock and Chase, of Hitchcock's *Manual* and my own manuscript-treatment *Panicum Benneri*, traced through the keys, comes directly to *P. villosissimum* Ell. Its very stiff habit, glabrous or essentially glabrous, short firm leaves, the very short and broad first glume of the spikelet, short-peduncled panicle, only slight (instead of usually pronounced) development of branches at the time of primary anthesis, and the relatively short and strongly pustular-based pubescence of the sheaths at once distinguish it. In *P. villosissimum* the culms are 2–7 dm. high and the leaf-blades of the vernal culms 6–11 cm. long, and 5–10 mm. wide, more or less pubescent on both faces; in *P. Benneri* the stiffly erect culms are 1.7–3.5 dm. high, the leaf-blades more lanceolate, 3.5–6.5 cm. long and 5–8 mm. wide, the upper surface hard and glabrous, the lower barely and minutely pilose, while the strongly pustular-based hairs of the sheaths of *P. Benneri* are shorter than the most often slender and more villous sheath-hairs of *P. villosissimum*. As above noted, *P. villosissimum*, while the vernal or primary panicles are intact, usually has well developed axillary

branches; in *P. Benneri* only a few, and those very short, such branches are developed. In *P. villosissimum* the fully developed primary panicles are 4–10 cm. long and on peduncles 0.3–1.7 dm. long; in *P. Benneri* the primary panicles are 2.5–6 cm. long and on peduncles only 0.5–4 cm. long. The first glume of *P. villosissimum* is ovate, one fourth to two fifths as long as the spikelet; in *P. Benneri* broadly deltoid-rotund and one fifth to barely one fourth the length of the spikelet.

In its very short and broad first glume the spikelet of *Panicum Benneri* suggests some variations of the heteromorphic *P. lanuginosum*, such as var. *fasciculatum* (Torr.) Fern. (*P. tennesseense* Ashe) or var. *septentrionale* Fern.; but its spikelets are altogether too large and the panicle too simply branched. In *P. lanuginosum* and its varieties the secondary branches of the panicle are themselves branched (whence *P. implicatum* Scribn.).

The once-forked branching of the panicle of *P. Benneri* is similar to that of *P. meridionale* (with spikelets 1.3–1.6, instead of 2.2–2.6 mm. long). It also suggests the panicle of the relatively northern *P. subvillosum* Ashe, but that characteristic species has the leaf-sheaths mostly equaling or exceeding, instead of shorter than the internodes, and appressed-pilose, instead of divergently hirsute with pustular-based hairs. Furthermore the axis of the panicle of *P. subvillosum* is appressed-pilose to glabrate, in *P. Benneri* divergently hirtellous, with some horizontally spreading villi; the spikelets of *P. subvillosum* are 1.8–2 mm. long, 0.9 mm. broad, and the prolonged first glume is one third to half the length of the spikelet.

Panicum Benneri, with which it is a privilege to associate the name of the keen and always helpful student of his local flora, Walter Mackinnett Benner, its discoverer, seems to be a real species. Whether it is relatively northern, as its type-region suggests, we do not know. It is more likely so, and to be sought in northeastern Pennsylvania and southern New York, than an extension from farther south in New Jersey and Pennsylvania where the small army of keen explorers would long ago have found it. Mr. Benner has most generously defrayed the expense of Plate 807.

In Plate 807, figs. 1 and 2 are portions of the type of Panicum Benneri, × 1; fig. 3, internode and cauline sheath, × 3; fig. 4, axis of panicle, × 10; fig. 5, spikelet, × 10.

XYRIS ALBIFLORA Raf. Aut. Bot. 190 (1840). *X. torta pallescens* C. Mohr, Contrib. U. S. Nat. Herb. vi. (Pl. Life Alab.), 428 (1901). *X. pallescens* (C. Mohr) Small, Fl. Se. U. S. 234 and 1328 (1903).

This distinctive white-flowered species of northwestern Florida and Alabama is related to *X. flexuosa* Muhl. and *X. fimbriata* Ell. in having exserted and fimbriate sepal-tips. It was well characterized by Rafinesque, who recognized its affinity with the latter species:

1420, X. or JUPICA? *albiflora* Raf. (X. cylindrica Baldw. mpt.) fol. strictis ensatis lato-planis striatis, scapis duplo longior teres anceps. sulcatis, capitulis ellipt. subcyl. obt. bract. dilatatis integris vel emarg. —Florida, disc. by Baldw. in 1815, not yet described, unless *X. fimbriata* of Elliot be very badly so, and appears rather an akin sp. leaves pedal, scape bipedal. fl. white by a note of Baldwin, while all others are yellow.

X. FISTULOSA Raf. l. c. (1840), based upon *X. juncea* Baldw., not R. Br., is X. BALDWINIANA Schultes, Mant. (1822). His X. RETUSA, l. c. 190 and X. SPIRALIS, l. c., are apparently X. TORTA J. E. Sm.

LUZULA ACUMINATA Raf. Aut. Bot. 193 (1840). *L. saltuensis* Fernald in RHODORA, v. 195 (1903). *Juncoides pilosum* (L.) Coville, var. *saltuense* (Fern.) Farwell in Mich. Acad. Sci. Rep. xx. 170 (1918). *L. carolinae* S. Wats., var. *saltuensis* (Fern.) Fern. in RHODORA, xl. 404 (1938).

Luzula saltuensis of woodland and thicket from Newfoundland to Saskatchewan, south into the Northern States and locally southward, was separated from the cespitose Eurasian *L. pilosa* (L.) Willd. because of its looser habit, with elongate more or less repent basal offsets, its paler and acuminate sepals and its more pointed capsules. Later (in 1938) I reduced it to varietal rank under the poorly typified *L. carolinae* S. Wats. in Proc. Am. Acad. xiv. 302 (1879), the latter southeastern plant being larger and with more forking branches to the corymb. It now seems that Rafinesque was nearly 40 years ahead of Watson and more than 60 ahead of me. There can be no doubt that his *L. acuminata* was *L. saltuensis*. His definition of it was good:

1447, *Luz. acuminata* Raf. repens, glabra, fol. lanceol. acum. striatis nervosis spiculis corymbosis congestis paucifloris fuscatis, calic. acum.— Boreal America, perhaps *J. pilosus* Mg. often blended with last, leaves broader and shorter, 3 uncial, stem semipedal, corymb. not exceeding the leaves, fl. small.

The taking up of *Luzula acuminata* (1840) necessitates the following combination

L. ACUMINATA Raf., var. **carolinae** (S. Wats.), comb. nov. *L. carolinae* S. Wats. in Proc. Am. Acad. xiv. 302 (1879). *Juncoides* (as *Juncodes*) *carolinae* (S. Wats.) Ktze. Rev. Gen. ii. 724 (1891).

LUZULA LABRADORICA Raf. l. c. (1840) was unquestionably L. PARVIFLORA (Ehrh.) Desv. (1808) or its var. *melanocarpa* (Michx.) Buchenau, which latter rests on *Juncus melanocarpus* Michx. (1803). Rafinesque's name antedates *L. labradorica* Steud. Syn. Pl. Gram. ii. 291 (1855), which is perhaps identical with it.

Rafinesque proposed nine North American species of the prophyllate *Junci*. Nothing sufficiently distinctive was given in his descriptions for us to be certain what he had. His J. FLORIDANUS, l. c. 194, was from "South Florida" and Engelmann in Trans. St. Louis Acad. Sci. ii. 451 (1866) cited as *J. Gerardi* Loisel. (1810) material from "North Carolina, *Curtis*, and Florida, *Ware* (*J. Floridanus*, Raf. in Hb. Durand)". This would seem to dispose of *J. floridanus*. It also gives the clue, that others of Rafinesque's *Junci* may have been in Durand's herbarium, now in Paris. Rafinesque's J. FUSCATUS, l. c. 194, from "Kentucky, Tennessee, &c", with "fl. quite peculiar", was earlier than *J. fuscatus* Turcz. ex Ledeb. (1853), the latter reduced by Buchenau to *J. triglumis* L. *J. fuscatus* Raf. is not clearly identified. So with his other names; they may rest undisturbed.

THE IDENTITY OF YUCCA FILAMENTOSA (PLATES 808 and 809).—*Yucca*, always a baffling genus to work with from herbarium material, has one species, *Y. filamentosa* L., which is reputed to follow much of the Coastal Plain from Louisiana to Florida and northward to North Carolina, with a related plant, *Y. concava* Haw. or *Y. filamentosa*, subforma *latifolia* Engelm., on coastwise sands from Georgia to New Jersey. The tendency has been to follow the conclusions of Engelmann in Trans. St. Louis Acad. Sci. iii. 17–54 (1873). In that study, treating *Y. filamentosa* as a complex species, some of the varieties native, others only in cultivation, Engelmann defined what he considered true *Y. filamentosa*, his forma *genuina*, with two subforms: "*a, angusti-*

folia", a plant with linear-lanceolate leaves gradually attenuate from the middle; and *b*, subforma *latifolia*, = *Y. concava* Haw., with broad and rigid lanceolate or spatulate leaves obtusely mucronate and cucullate at tip. He concluded that the brief diagnosis quoted by Linnaeus from Gronovius, "foliis lanceolatis acuminatis together with the Hab. Virginia, points to the narrow-leaved form of what I have described as the genuine plant, as the one he and Gronovius had in view. Of this and other forms numerous specimens and full notes have been obtained from Dr. Mellichamp, of South Carolina, on which the following descriptions are based." Engelmann then went on to discuss the "narrow-leaved form" and the "broad-leaved variety", which in his Latin account were both subordinate to his "*Forma genuina*". In 1880 Baker, Journ. Linn. Soc. Bot. xviii. 227, 228 (1880), split *Y. filamentosa* into ten varieties, many of them cultivated only, with the broad natural range, "*Regiones littorales Americae borealis a Maryland ad Floridam*", treating *Y. concava* Haworth as *Y. filamentosa*, "var. *Y. concava*" and not citing *Y. filamentosa*, forma *genuina*, subf. *latifolia* Engelm. under it. Subsequently, Trelease, Mo. Bot. Gard. 13th Ann. Rep. 46–49 (1902), accepting Engelmann's and Baker's divisions in the main, likewise made typical *Y. filamentosa* the plant with "Leaves 25–40 cm. wide, gradually acute, rather rigid . . . Capsules rather narrowly cylindric", this plant shown in a photograph (his pl. 8, fig. 1) with narrowly linear-lanceolate and long, attenuate leaves, while its capsule (his pl. 12, fig. 1) was shown as 4–5 cm. long. This plant, taken by Engelmann, Baker, Trelease and subsequent authors as true *Y. filamentosa*, was assigned the range: "West-central North Carolina to southeastern South Carolina, Florida from Jacksonville to Tampa, and doubtless in the intervening country". The plant with shorter, broader, more oblong-oblanceolate to spatulate and, in maturity, harshly scabrous heavy leaves, the *Y. filamentosa*, forma *genuina*, subf. *latifolia* Engelm., was taken up as var. *concava* (Haworth) Baker and a good portrait of a growing plant given (Trelease, pl. 10), showing the very characteristic and short, lanceolate, broad leaves, this very distinct plant given a range from South Carolina and Georgia to Maryland.

It remained for Small, Man. 303 (1933) to see stronger differ-

ences. Still adhering to the plant with "Leaf-blades of a linear type, somewhat narrowed toward both ends, attenuate to the slender apical spine, flat" as *Y. filamentosa*, with the range "Fla. to Miss., Tenn. and N. C.", this plant with "petals broadly ovate, 4–5 cm. long: capsule 5–6 cm. long", he correctly recognized another species, as *Y. concava*, with "Leaf-blades spatulate, abruptly narrowed or rounded and concave at the base of the stout apical spine", the species occurring from "Ga. to Del." and having "sepals and petals usually broader" than in the former and the capsule only 4–5 cm. long, the seeds rounder.

Ever since our first trip together to Virginia, Long and I have become very familiar there with the plant we have regularly called *Yucca concava*, following the treatment of Small. It occurs back of the outer beaches and among the dunes, and in sandy fields, roadsides and dry pineland back from the coast at least 80 miles (to the easternmost border of Dinwiddie County). Baker's "*Regiones littorales*" tells only part of the story. Throughout all this region of eastern Virginia, thence northward, the plant is constant in foliage, flowers and fruit, the plant beautifully illustrated in Sims, Bot. Mag. xxiii. pl. 900 (1806) as *Y. filamentosa*, its habit shown by Trelease, l. c. pl. 10. In this plant (our PLATE 808) the flowers are 5–7 cm. long, the petals 2–3 cm. broad and rounded to the short acumination, the filaments spiculate-papillate in irregular lines, the style in anthesis about 1 cm. long, the capsule thick-cylindric to short-ovoid, inclined to be constricted at or near the middle and dumbbell-like, 1.5–4.5 cm. long; the semiorbicular seeds 6–7 mm. long by 3–5.5 mm. broad.

In *Yucca filamentosa* sensu Engelmann, Baker, Trelease and others, including Small, who seems first to have recognized the best specific characters, the southern plant (our PLATE 809) with linear-lanceolate long-tapering leaves, the flowers are only 3–5 cm. long, the petals 1–2 cm. broad and tapering to gradually acuminate tips, the filaments nearly pilose with elongate trichomes (especially at base), the style at flowering time nearly obsolete or up to only 5 mm. long, the more uniformly subterete capsule 4–6 cm. long.

When Engelmann assumed, because he had material from South Carolina of the latter plant, that it must, therefore, be the

Virginian plant, "In littoribus arenosis fluminum crescit", of Clayton, which is the type of *Yucca filamentosa* L., he was at least naïve. Not all plants of South Carolina and Virginia are identical. In exploring the southeastern counties of Virginia Mr. Long and I have often noticed that farmers frequently set young plants of their native *Yucca* along roadways and in sandy clearings. Our driver for some seasons, a farmer of keen intelligence, Leonard Birdsall, explained that they harvest the hard leaves as "SILKGRASS", and after macerating them and softening the tissue, remove the strong threads for use in tying bunched vegetables. This plant, *Y. concava*, being the abundant and, so far as we know, the only native species of the genus in eastern Virginia, it is not surprising that the specimen preserved at the British Museum (photograph sent by Dr. RAMSBOTTOM) should show the characteristic flowers (PLATE 808, FIG. 1)—the two smallish ones at the tips of branches—of typical *Y. concava*, nor that Clayton's no. 720 (miscopied by Gronovius as 270), the TYPE of *Y. filamentosa*, should have been labeled by him: "Yucca flore albo, foliorum marginibus fllamentosis. **Silkgrass.**"

The type of *Yucca filamentosa* L. Sp. Pl. 319 (1753) being the relatively northern *Y. concava*, it is necessary to find the proper specific name for *Y. filamentosa* sensu Small, the *Y. filamentosa*, forma *genuina*, subf. *angustifolia* of Engelmann. Study of the bibliographies of Engelmann, Baker and Trelease yielding none, I venture to name the narrow- and smoother-leaved southern plant for the botanist who first saw its specific differences. It is a pleasure so to do; it is not always that I can follow him. I am calling it

YUCCA **Smalliana,** sp. nov. *Y. filamentosa* sensu Small, Man. Se. Fl. 303 (1933), not L. *Y. filamentosa*, forma *genuina*, subf. *angustifolia* Engelm. in Trans. St. Louis Acad. Sci. iii. 51 (1873), not *Y. angustifolia* Pursh (1814). TYPE: sandy soil near Jacksonville, Florida, May, *A. H. Curtiss*, no. 2950, in Herb. Gray. PLATE 809.

Although Small states that the smaller-flowered and more southern *Yucca Smalliana* (*Y. filamentosa* sensu Small, not L.) has "panicle-branches glabrous", the material before me shows them merely glabrescent. At flowering time they are pruinose-pilose, only in fruit becoming glabrate. True northern *Y. filamentosa* has the panicle glabrous from the first. In its pubescent

panicle *Y. Smalliana* suggests the upland *Y. flaccida* Haw., of the Blue Ridge and adjacent uplands, which may have pubescent or glabrescent panicle; but, as I understand it, *Y. flaccida* has very pliable and thin leaves, very broad and abruptly short-acuminate petals (as shown in Lindl. Bot. Reg. xx. t. 1895 (1836)), and the native specimens which seem to belong to it have the style elongate and the broad and flat filaments coarsely ciliate. In *Y. Smalliana* (PL. 809) the flower is smaller, with much narrower and acuminate sepals and petals, the style obsolete or very short, and the filaments less flattened and finely pruinose-pilose.

PLATE 808 is of YUCCA FILAMENTOSA L.: FIG. 1, terminal flowers, × 1, from the TYPE (from photograph sent by Dr. *John Ramsbottom*); FIG. 2, characteristic leaves, × ½, from Old Town Neck, Northampton County, Virginia, *Fernald, Long & Fogg*, no. 5269; FIGS. 3 and 4, flowers, × 1, from Cape Henry, Virginia, *Fernald, Griscom & Long*, no. 4707; FIG. 5, ovary, style and filaments, × 3, from no. 4707; FIG. 6, ripe capsules, × 1, from south of South Quay, Virginia, *Fernald & Long*, no. 10,585.

PLATE 809, YUCCA SMALLIANA Fernald: FIG. 1, leaves and flowers, × ½, from TYPE; FIG. 2, basal rosette, greatly reduced, from Florida, photo. by *A. H. Curtiss*, 1887; FIGS. 3 and 4, flowers, × 1, from TYPE; FIG. 5, ovary, style and filaments, × 3, from TYPE; FIG. 6, capsule, × 1, from Florida, *A. H. Curtiss*.

SPECIFIC DISTINCTIONS BETWEEN POLYGONATUM BIFLORUM AND P. CANALICULATUM.—More than a decade ago, while studying with me, Dr. W. A. Anderson, Jr. clearly worked out the proper nomenclature and the specific characters of our American species of *Polygonatum* and, although he published[1] his study of *Trillium* in Tennessee, he has, unfortunately, not stated in print his conclusions regarding *Polygonatum*. In the Manual range we have three indigenous species, *P. pubescens* (Willd.) Pursh, quickly distinguished by having superficial rhizomes, minutely pilose or hirtellous lower leaf-surfaces, lowest peduncle usually from the 1st or 2nd leaf-axil, perianth 7–13 mm. long, with stamens inserted high on the tube; and *P. biflorum* (Walt.) Ell. and *P. canaliculatum* (Muhl.) Pursh (*P. commutatum* (R. & S.) Dietr. and *P. giganteum* Dietr.), formerly needlessly confused and, judging from recent identifications, not usually understood, two very different species with deep-seated rhizomes, glabrous lower leaf-surfaces, lowest peduncle usually from the 3d–5th leaf-axil, perianth 1–2 cm. long, stamens inserted near middle of

[1] W. A. Anderson, Notes on the Flora of Tennessee: the Genus Trillium. RHODORA, XXXVI. 119–128 (1934).

the tube. Dr. Anderson, with the collaboration of Mr. C. A. Weatherby, found so many distinctive characters and in my own detailed study so many others become evident that it may be helpful to others to have these distinctions pointed out. The usual failure clearly to separate the two species, *P. biflorum* and *P. canaliculatum*, is reflected in many recent local floras. Thus Wiegand & Eames in their very helpful and usually keenly discriminating Flora of the Cayuga Lake Basin give two types of habitats for their inclusive *P. biflorum:* "Sandy or gravelly, rarely clayey, banks and thickets, in subneutral soil, on dry hillsides and hilltops, or in alluvial calcareous soils on river banks". Several of the collections cited by them are represented in the Gray Herbarium. Those from "Sandy or gravelly . . . banks", etc. are characteristic *P. biflorum:* "dry ravine bank, between Renovick and McKinney's", etc., these plants having the characteristic slender rhizome, slender stem only 6–7 dm. high, flat and relatively few-nerved, merely sessile leaves, lowest peduncle from the 3d leaf-axil and 1.2–2 cm. long, with the 2 or 3 pedicels 0.5–1.4 cm. long, and slender perianth with lobes 3.5 mm. long. The material from "alluvial calcareous soils" is characteristic *P. canaliculatum:* "Valley of Inlet, Ithaca", etc., the plants with rhizome more than 2 cm. thick, stout stem (1 cm. thick) 2 m. high, with clasping-based corrugated and undulate-margined leaves with about 200 nerves, the flowering peduncles up to 9 cm. long, with 4–7 pedicels up to 2.5 cm. long, the thicker perianth with lobes 6 mm. long. Again, in that compendium of accurate local field-observation, Deam's Flora of Indiana, the author, beautifully distinguishing the pubescent-leaved *P. pubescens*, with superficial rhizome, from the glabrous-leaved plants with deep-seated rhizomes, which he unwillingly treated as one species, *P. biflorum*, wrote: "My study of this species complex was made from 155 specimens which I have collected from all parts of the state. I am not satisfied with the treatment of this species but I am not able to find differences sufficient to separate them . . . I do not think them all the same species . . . The genus has been monographed by three authors and my specimens have been seen by one of them but I cannot accept their treatment of this complex." Such observations indicate the need of better statements of the char-

acters, and the misidentifications in the herbaria (including our recent collections from Virginia as identified by a student of the group) also indicate such a need.

Very briefly my conclusions follow:

POLYGONATUM BIFLORUM (Walt.) Ell. Rhizome 0.6–1.5 cm. thick; stem slender, 1.5–5 mm. thick below lowest leaf, 2–9 dm. high; leaves flat, sessile or nearly so, narrowly lanceolate to broadly ovate, the largest ones (of each plant) with 46–120 nerves and 5.5–15 cm. long by 1.2–6 cm. broad, the terminal small ones 20–66-nerved; peduncles 1–4 cm. long, 1–3 (–5)-flowered, the lowest usually borne from the 3d (1st–5th) axil; pedicels becoming 0.5–2 cm. long; perianth slenderly cylindric, 1–1.7 cm. long, its lobes 3–4 mm. long; filaments commonly papillate or granulose, slender; enlarged terminal joint of fruiting pedicel cupshaped or campanulate, with the rim flaring, 0.7–1.5 mm. long, often as broad; seeds 2.7–3.5 mm. long.—Dry to moist, sandy, loamy or rocky woods and thickets, Florida to Texas, north to Connecticut, New York, southern Ontario, southern Michigan, Illinois, Iowa and Nebraska.

P. CANALICULATUM (Muhl.) Pursh. Rhizome 1.5–3 cm. thick; stem stout, 0.5–1.3 cm. thick at lowest leaves, 0.6–2 m. high; leaves more or less corrugated and with puckered margin (not drying flat), mostly narrowed to broad clasping or sheathing subpetiolar bases, the larger ones with 110–220 nerves and 0.9–2.5 dm. long by 3.5–13 cm. broad, the smallest terminal ones 58–112-nerved; peduncles becoming 1.5–9 cm. long, 2–10-flowered, the lowest commonly borne from the 4th or 5th (3rd–8th) axil; perianth thick-cylindric, 1.7–2 cm. long, its lobes 5–6.5 mm. long; filaments broad, smooth or merely granulose; enlarged terminal joint of fruiting pedicel subcylindric to slenderly campanulate (except at flaring summit), 1–3 mm. long, usually longer than thick; seeds 3–4.5 mm. long.—Rich woods, alluvial thickets, river-silts and other calcareous habitats, Connecticut Valley of New Hampshire to southern Manitoba, south to South Carolina, Tennessee, Missouri and Oklahoma.

Many reputed species and varieties have been proposed, based upon shade of color, breadth of leaf, etc. These I am not here discussing. That is for a monographer who has studied them all. So far as I have seen they do not affect the fundamental specific characters of the species long ago defined. In fact, I have recently been challenged to point out any *real* characters distinguishing *P. canaliculatum* from *P. biflorum*. The above is my answer. What better characters could be found in the *Liliaceae?*

The position of the lowest peduncle, a splendid character pointed out by Deam, is certainly significant. I have noted its position in all specimens in the Gray Herbarium and that of the New England Botanical Club. The results follow.

P. PUBESCENS: of 365 plants 100 (27+ per cent.) have the lowest peduncle from the 1st axil, 241 (66+ per cent.) from the 2nd, 20 from the 3rd and only 1 from the 4th.

P. BIFLORUM: of 116 plants 3 have the lowest peduncle from the 1st axil, 12 (10 per cent.) from the 2nd, 68 (59+ per cent.) from the 3rd, 28 (24+ per cent.) from the 4th, and 5 from the 5th.

P. CANALICULATUM: of 41 specimens 4 (10 per cent.) have the lowest peduncle from the 3rd axil, 17 (41+ per cent.) from the 4th, 13 (31+ per cent.) from the 5th, 1 from the 6th, 2 from the 7th, and 1 from the 8th.

A biologically interesting form, because flowering from elongate leafy axillary branches, of *Polygonatum biflorum* is

P. BIFLORUM, forma **ramosum** (McGivney), comb. nov. *P. commutatum*, forma *ramosum* McGivney in Am. Midl. Nat. ix. 664, fig. (1925).

THE INDIGENOUS ALLEGHENIAN CONVALLARIA.—The native Lily-of-the-Valley, occurring in acid rocky or sandy woods, summits and upper ravines of the mountains from Virginia and eastern West Virginia to northern Georgia and eastern Tennessee, is much larger than the European *Convallaria majalis* L., the plant so generally cultivated and naturalized near settlements; and, as Professor Massey writes me, no one knowing its stations high on the mountains would think of calling it "of the Valley." In the European species the scape is elongate, so that the flowers are borne opposite the middle or upper halves of the leaves; the leafy axis (to the base of the upper leaf) is, except in highly cultivated plants, 5–12 cm. high, with the larger leaves 1–2 dm. long and 3–7.5 cm. broad, their veins and cross-partitions, as seen by transmitted light, relatively faint and pale; the longer bracts of the raceme are lanceolate, 4–10 mm. long, and much shorter than the pedicels; and the seeds are nearly globose. In the native eastern American species the scape and raceme are shorter than the leafy axis or barely reaching the lower half of the lowest leaf; the leafy axis is 1.5–2 dm. high, with the larger clear green (not glaucescent) leaves 1.5–3 dm. long and 4–12 cm. broad, strongly nerved, the dark nerves and cross-partitions sharply visible by transmitted light; the longest bracts of the

raceme are almost linear, 0.8–2 cm. long and nearly equaling to much exceeding the pedicels; and the seeds are compressed, either oblate or somewhat lenticular.

In recent years the Alleghenian native has been known as *Convallaria majuscula* Greene in Fedde, Rep. Nov. Spec. v. 46 (1908). Greene proposed two species, *C. globosa*, l. c., a plant cultivated by the late Robert Ridgway who received it from a dealer as found in the mountains of North Carolina, and *C. majuscula*, "occasionally collected in the higher mountains of V i r g i n i a, from the Peaks of Otter northward; also in those of southeastern P e n n s y l v a n i a. . . . it differs totally from that [*C. majalis*] in its very large light-green leaves without trace of bloom, with excessively fibrous anatomy, insomuch that the surface of the leaf when growing looks to be plicate rather than plane and even. Both these American species . . . when compared with *C. majalis*, flower much later, their foliage perishing at the end of summer." There are no evident specific characters separating the cultivated *C. globosa* and the indigenous plant of western Virginia, therefore the name *C. majuscula* has come into use.

There is, however, a perfectly available name for the native plant, which was well described 68 years before Greene's publication. This is *Convallaria montana* Raf. Aut. Bot. 66 (1840). Rafinesque's account, quite as good as Greene's, was as follows:

> 486, *Conval, montana* Raf. (pseudlo-majalis Bartr. in Rees cycl. Am. ed.) fol. binis sessilib. ovatobl. acum. scapo angul. fol. subeq. racemo 10–12 floris, bract. lanc. ad ped. eq. fl. secundis—Unaka and Cherokis Mts. large plant, leaves 6 to 8 inches long, 2 wide, fl. size of C. majalis. Bartram says the berries are blue and ovate. C. majalis has leaves petiolate elliptic acute at both ends, raceme of 7–8 fl. bracts half length of pedicels.

Rafinesque had, also, a *Convallaria parviflora*, l. c. with "scapo filif. fol. brevior." etc., from "Appalachian and Wasioto Mts." Whether this was small-flowered *C. montana* or the introduced plant I do not feel certain, but the identity of *C. montana* and *C. majuscula* can hardly be questioned.

From Rafinesque's reference to Bartram it would appear that the latter had still earlier given the correct name to our native *Convallaria*. In Rees Cycl. Am. ed. x. (1810 or later), after the original British treatment there occurs the following unsigned and bracketed note:

[To these we will add, from Bartram, *C. pseudo-majalis*, mountain lilly of the valley. This charming plant is indigenous to the mountainous parts of the United States of America, particularly the country of the Cherokees, in the rich glades or shady vallies in their mountains, and in the like situations in Pennsylvania. It differs but little from C. majalis of Europe, only is larger every way, and the fruit blue and more oblong to ovate.]

Here, of course, was where Rafinesque got his quotation from Bartram about the blue berries. In his Travels (1791) Bartram repeatedly noted *Convallaria majalis* from the upper slopes of the Cherokee country but I have been unable to find him giving in print a new name or noting the "blue" berries. Since *C. montana* (or *C. majuscula*) has, as I am assured by Professor Massey and others who are familiar with it in the wild, RED berries we can hardly accept *C. pseudo-majalis* as properly diagnosed. Bartram could quite as well have had *Polygonatum!* The synonymy of our native species is as follows:

CONVALLARIA MONTANA Raf. Aut. Bot. 66 (1840), excluding the synonym *C. pseudo-majalis* Bartr. ex Rees Cycl. Am. ed. x (1810 or later) as too doubtful on account of the blue fruit. ?*C. parviflora* Raf. l. c. (1840). *C. globosa* Greene in Fedde, Rep. Nov. Spec. v. 46 (1908). *C. majuscula* Greene, l. c. (1908); Fernald in RHODORA, XXX. 184, foot-note (1928) and XXXIX. 347, foot-note (1937).

TRILLIUM CATESBAEI AND T. NERVOSUM Ell. (PLATES 810 and 811).—Elliott, Sk. i. 429 (1817), described two new species, *Trillium Catesbaei* and *T. nervosum*. The first, which he took to be the same as the plant illustrated by Catesby, Nat. Hist. Carol. etc., i. t. 45, as *Solanum triphyllon; flore hexapetalo, carneo* (our PLATE 811, FIG. 1) was described as follows

8. CATESBAEI. E.

T. pedunculo recurvato; petalis lanceolatis, calyce majoribus; foliis obovatis ovalibusque, acuminatis, basi attenuatis. E.	Peduncle recurved; petals lanceolate, larger than the calyx; leaves obovate and oval, acuminate, tapering at base.

Catesby, Carol. p. 45, t. 45.
T. cernuum, Michx. 1. p. 216?

Leaves 4–6 inches long, rather obovate, 3 inches wide, tapering to the base and not abruptly acuminate at the summit. *Petals* lanceolate, expanding, undulate, rose coloured. Leaves of the *calyx* long, narrow.

[Then a paragraph of more or less pertinent observation, with the conclusion that his plant, coming from the same region as Catesby's, must be identical.]

Pendelton county, South-Carolina; Mesrs. Baker & Perry.

The second of these new species (our PLATE 810, FIG. 2) was

9. NERVOSUM. E.

T. pedunculo recurvato; petalis oblongo-lanceolatis, calyce majoribus; foliis lanceolatis ovatisque, utrinque acutis, membranaceis, nervosis. E.

Peduncle recurved; petals oblong lanceolate, larger than the calyx; leaves lanceolate and ovate, acute at each end, membranaceous, nerved.

Plant 6–8 inches high. *Leaves* generally narrower than those of the *T. sessile*, most commonly lanceolate, membranaceous, somewhat 3 nerved. *Peduncles* about an inch long. *Petals* rose coloured.

Grows in the upper and middle country of Georgia and Carolina. Athens; Mr. Green. The T. cernuum of Walter probably belongs to this species.

Now, if anything is clear, it is that the plants which Elliott was describing differed strikingly as follows: *T. Catesbaei* with "rather obovate" leaves 3 inches broad, *T. nervosum* with them lanceolate and ovate ("most commonly lanceolate") tapering at both ends.

Most fortunately, Elliott's Herbarium, which, in the past suffered serious destruction by insects, mould and the removal of specimens, still contains these two types in good condition. They were photographed in October, 1941, by Mr. and Mrs. Weatherby, their photographs (our PLATE 810) now in the Gray Herbarium. Although it is, as said, most fortunate that the types exist and closely agree with Elliott's descriptions, it is most unfortunate that Elliott identified his plant with obovate-oval broad leaves with Catesby's plate and, consequently, called this species *T. Catesbaei*. The type of *T. Catesbaei* has elongate, curving stigmas sessile at the summit of the ovary, while its petals are pretty broad to be called lanceolate. The type of the narrow- and tapering-leaved *T. nervosum* has a definite style capping the ovary (PLATE 810, FIG. 2). In other words, the type of *T. nervosum* is identifiable with *T. stylosum* Nutt. Now, if Catesby's plate be examined it will be seen (our PLATE 811) that the leaves are those of *T. nervosum* and that, in the Catesby drawing of the fruit (our FIG. 2) there is a definite style. Elliott evidently "got the wires crossed" and identified the Catesby plate with the wrong plant; and Rendle, Journ. Bot. xxxix. 333 (1901), said "In the absence of the specimens which Elliott had before him, Catesby's figure (which he cites) is the only authority for this species." He, therefore, took up *T. Catesbaei* for the

narrow-leaved plant with definite style as impressionistically shown in Catesby's plate (impressionistically, because Catesby had the sepals beautifully roseate and petaloid, just like the petals!) and a plant of the Carolina mountains with broadly rhombic leaves he described and illustrated as *T. Rugelii* Rendle in Journ. Bot. xxxix. 381, t. 426 B (1901). Rendle's illustration shows broadly rhombic leaves 11.5 cm. wide; material from the same general region, Highlands, North Carolina, April, 1903, *Harbison*, has them less broadly tapering at base, tending to obovate and 6–9.5 cm. broad; Harper's no. 1891 from Randolph County, Georgia, generally identified with *T. Rugelii*, has them in outline nearly as in the type of *T. Catesbaei* and 9–12 cm. broad; and Harper's no. 3492 from Tuscaloosa County, Alabama, has them definitely rhombic-obovate and 7.5 cm. broad; while the type of *T. Catesbaei* has them 9–10 cm. broad. All these, as I understand the plants, show the usual range of variation in the leaves and are all T. CATESBAEI Ell. (1817). They are also *T. Rugelii* Rendle (1901), for, since "the absence of the specimens which Elliott had before him" is now rectified by looking in Elliott's Herbarium at Charleston, not in the British Museum, the identity of *T. Catesbaei* has become clarified.

Early Carolina botanists clearly recognized that *T. nervosum* Ell. (1817) was the same as *T. stylosum* Nutt. (1818) and many sheets from M. A. Curtis had both names (often bracketed) on their labels. They were right. The error occurred when *T. nervosum* was dropped (as by Small) and *T. Catesbaei* (following the gratuitous assumption of Rendle) was wrongly used in the sense of *T. stylosum*.

IN PLATE 810, FIG. 1 is the TYPE of TRILLIUM CATESBAEI Elliott, × 1, after a photograph by *C. A. and Una F. Weatherby.* FIGS. 2 and 3, T. NERVOSUM Ell.: FIG. 2, the TYPE-SHEET × ½, after a photograph by *C. A. and Una F. Weatherby;* FIG. 3, detail of flower in central specimen of fig. 2, to show style, × 3.

PLATE 811, FIGS. 1 and 2, portions of Catesby's plate of *Solanum triphyllon; flore hexapetalo, carneo*, Nat. Hist. Carol. i. t. 45: FIG. 1, flowering summit, × 1; FIG. 2, fruit, showing style, × 1. FIG. 3, leaf, × 1, of TYPE of SMILAX BONA-NOX L., var. EXAURICULATA Fernald.

TRILLIUM FLEXIPES Raf. Aut. Bot. 133 (1840). *T. erectum*, var. *declinatum* Gray, Man. ed. 5: 523 (1867). *T. declinatum* (Gray) Gleason in Bull. Torr. Bot. Cl. xxxiii. 389 (1906), not Raf. Aut. Bot. 135 (1840). *T. Gleasoni* Fernald in RHODORA, xxxiv. 21 (1932).

Rafinesque's description of *Trillium flexipes* was unusually good, for him:

968, *Tril. A* [i. e. his subgenus *Anthopium*, with peduncled flowers and sessile stigmas] *flexipes* Raf. caule sulcato, fol. sessil. obovatis acuminatis undul. 3nervis, pedunc. equante inclinato flexuoso, calix lanceol. acum. petalis albis eq. obl. acut. undul.—West Kentucky and Tennessee, rare, pedal, leaves 3 inches long, 2 broad, flowers middle size.

The inclined peduncle about equaling (in early anthesis) the sessile, acuminate, obovate leaves, the acuminate, lanceolate sepals and the equal, oblong white petals are all good characters of *Trillium Gleasoni*. That it occurs in western Kentucky there can be no question. Witness *Shacklette*, no. 378 from Union County, Kentucky. Wiegand & Eames, in their study of the group, cited it from Tennessee in RHODORA, XXV. 190 (1923) as did Small (Man.); and it occurs in eastern Missouri. There is no reasonable doubt about *T. flexipes*. The form with maroon or purple petals is

Forma **Walpolei** (Farw.), comb. nov. *T. cernuum*, var. *declinatum*, forma *Walpolei* Farw. in Rep. Mich. Acad. Sci. xxi. 363 (1920).

T. DECLINATUM Raf. l. c. 135 (1840) and T. BALDUINIANUM Raf. l. c. 135 (1840) are probably both forms of T. NERVOSUM Ell.

T. LANCIFOLIUM Raf. l. c. 132 (1840) can hardly be anything but *T. recurvatum*, var.(?) *lanceolatum* (Boykin) S. Wats. in Proc. Am. Acad. xiv. 273 (1879), based upon T. LANCEOLATUM Boykin in herb. in Wats. l. c. 274 (1879). Watson treated *T. lanceolatum* as a doubtful variety of the northern and wide-ranging *T. recurvatum* Beck, but, as Small, Bull. Torr. Bot. Cl. xxiv. 171 and 174 (1897), showed, the two are well distinguished species. Small (Man.) gives the range of *T. lanceolatum* as "W. Fla. to La., Tenn. and Ga." and in RHODORA, xlv. plate 773, fig. 3 (1943), I showed, life-size, the summit of a characteristic plant, × 1, from northwestern Florida, the original specimen 11 inches high. If Rafinesque's description be compared with this figure the identity of *T. lanceolatum* Boykin (1879) and *T. lancifolium* Raf. (1840) will be apparent:

962, *Tril. S.* [subgenus *Sessilium*] *lancifolium* Raf. caule elato, fol. sess. lanceol. acutis trinervis patulis planis sepe maculatis, calicib. patulis vel reflexis, petalis erectis longior rubris unguic. lanceol.—Florida to Alabama and Apalachian Mts. stem often pedal leaves 3 inches, flowers uncial.

As to "flowers uncial.", the petals vary from 1.5–4.5 cm. long, the lower measurement being less than "uncial."

We do not know true *Trillium lancifolium* (*T. lanceolatum*) in the Gray's Manual area, although Rendle, Journ. Bot. xxxix. 327 (1901), referred to "Specimens which I have seen from Kentucky (*Short*)". The specimens which are in American herbaria, accompanied by Short's label with the print, "C. W. SHORT, *M.D.* KENTUCKY, 1840" fortunately bear, in his hand, the written memorandum, "From Dr. Boykin, Ga.". In other words, they are isotypes of Boykin's species.

T. CUNEATUM Raf. Aut. Bot. 133 (1840). *T. Hugeri* Small, Fl. Se. U. S. 277 and 1328 (1903).

Trillium cuneatum was thus described:

964, *Tril. S.* [subgenus *Sessilium*] *cuneatum* Raf. caule elato, fol. sessilib. ovatobl. acutis trinervis planis concolor, calicib. erectis obl. petalis cuneatis duplo longior acutis purpurascens.—Unaka Mts. of Cherokis, pedal leaves 3 inches, flowers large akin to those of Tr. maculatum, but leaves very different.

It is most difficult to believe that Rafinesque's plant from the Cherokee country, with ovate-oblong acute green leaves, oblong sepals and cuneate purplish petals twice as long as the sepals is not the characteristic large-flowered *T. Hugeri* (type from Tryon Mt., North Carolina), which abounds in the Appalachian region from northwestern Florida and Alabama northward to North Carolina and Kentucky. Rafinesque compared it with his earlier published *T. maculatum*, "of the coastal plain and piedmont regions from the Carolinas to Alabama and Mississippi", with, further, to quote Dr. W. A. Anderson in RHODORA, xxxvi. 122, 123 (1934), "leaves . . . lance-ovate, . . . strongly mottled, mottling tending to form longitudinal stripes; sepals 2.5–5 cm. long. . . , lanceolate, acute; petals 3.5–6 cm. long". Anderson, identifying T. MACULATUM Raf. (1830) with *T. Underwoodii* Small (1897), said "Among the numerous species of *Trillium* described by Rafinesque, this one is unmistakable".

By Small (Man.) his Coastal Plain *Trillium Underwoodii* (*T. maculatum* Raf.) is, in the key, separated from his montane *T. Hugeri* (*T. cuneatum* Raf.) by its narrower leaves ("bracts"), in the former "much longer than wide, often twice as long", in the

latter "nearly or quite as wide as long". From the type-locality and the description *T. cuneatum* well matches the more oblong-ovate-leaved extreme of the Appalachian *T. Hugeri*, originally described by Small with "blades . . . bright green [Raf. said 'concolor'] . . . , sepals oblong to oblong-lanceolate [Raf. said 'obl.'], . . . petals oblong-lanceolate to spatulate, purple, somewhat longer than the sepals [Raf. said 'cuneatis duplo longior . . . purpurascens']."

Rafinesque had no less than 34 so-called species and 67 so-called varieties[1] of *Trillium*. A few species, as noted above, were described with sufficient clarity to be recognizable. In these cases his names, when having priority, are automatically taken up. *T. flexipes* Raf. thus displaces *T. Gleasoni* Fernald, *T. lancifolium* Raf. throws out *T. lanceolatum* (Boykin) S. Watson, *T. cuneatum* Raf. antedates *T. Hugeri* Small, and *T. maculatum* Raf. replaces *T. Underwoodii* Small. Most of the others are too vague for recognition, others are definite renamings of already properly published species, often with mere undefined varietal names: for instance, *T. rotundifolium* Raf., with a brief description which is applicable to *T. erectum* L., and "Var. 1. *Flexicaule.* 2. *Rubricaule.* 3. *Maculatum.* 4. *Orbiculatum.* 5. *Pallidum.* 6. *Undulatum.*" These six varietal names are, of course, *nomina nuda* and have no status; their publication does not indicate a sound mentality or genius as a phytographer. Nevertheless, although (his p. xxi) acknowledging what any clear thinker quickly sees, that "Rafinesque's genius is debatable in the extreme", that "unbalanced . . . he may have been" (his p. 166) and (his p. 263) that "A Dr. Faustus, dangerously experimenting, tempting the rack or devil-ridden madness, would certainly correspond in a crude way to Rafinesque", one of the few monographers of *Trillium*, Mr. Donald Culross Peattie, becomes ebullient over this erratic and "unbalanced" man, whom, nevertheless, he considers "one of the most prodigious and prophetic scientists of the century 1750 to 1850" (his p. 261)—the century, to mention a few botanists only, of Haller, Linnaeus, Lamarck, Humboldt, Robert Brown, DeCandolle, Darwin, young Gray and his friend, young Joseph Hooker, and

[1] Dr. Merrill calls my attention to the fact that Rafinesque, with 67 varieties in *Trillium*, set a score not achieved by the much advertised Heinz's "57 varieties".

countless others for whom no one has the "nerve" to apologize and who were respected by every one for sanity, clarity and sound scholarship. Peattie, over-enthusiasitc about the "prophetic" nature of Rafinesque's unbalanced work, wrote (Green Laurels, p. 266): "If the rules of priority were strictly and justly applied, Rafinesque would be found to have antedated a large part of the work . . . in botany of Gray and DeCandolle". Whew! Rafinesque himself might well have written such a sentence; his introverted brain (likewise that of Marcus Jones) frequently brought forth just such statements.

But, returning to *Trillium*. One of the few monographic studies of *Trillium* is that of Peattie, *Trillium in North and South Carolina*, in Journ. Elisha Mitchell Soc. xlii. 192–206 (1927) and, as an outgrowth of this, the treatment of the genus in Small's Manual (1933). In the former treatment we read (p. 193): "Following Asa Gray, who eschewed anything from Rafinesque's pen, Sereno Watson[1] . . . reduced to synonymy or varietal rank the greater part of Rafinesque's . . . names of *Trillium*. It was not until Small showed the limited nature of *T. sessile* L. and set off *T. Underwoodii* and later *T. Hugeri* that our knowledge of the genus drifted out of the doldrums into which workers like Watson [whose great genius and just fame need no defense], with almost no field knowledge, had put us". In view of Peattie's evaluation of the work of Rafinesque it is, consequently, amazing that he so consistently ignored his 34 species and 67 varieties of *Trillium*, many of them described from the Carolinas or other Southern States, and that he failed to welcome the opportunity to displace *T. Hugeri* and *T. Underwoodii* of Small by Rafinesque's names of 1840 and 1830 respectively.

[1] Peattie seems to overlook the patent fact that both Asa Gray and his friend Alphonse DeCandolle (dim lights, one gathers, as compared with his hero) regularly took up Rafinesque's genera and species when they were definite and had priority: *Peltandra* Raf., including *P. undulata* and *P. alba* Raf. *Clintonia* Raf., with the species *C. borealis* Raf.; *Hexalectris* Raf., with the species *H. aphylla* Raf.; *Adlumia* Raf., with the species *A. cirrhosa* Raf.; and so on with scores of other genera. This was far from "eschewing" his work, when sound. It was not the fault of either DeCandolle or Gray that the great majority of Rafinesque's genera and species had been earlier described or were so vague as to be undecipherable. Neither is it through the "prejudice" imagined by Peattie that earlier specific names have been taken up in Rafinesque's genera *Peltandra, Hexalectris, Adlumia, Cladrastis, Nemopanthus, Osmorhiza*, etc., nor that later monographers have discarded his genera *Didiplis, Steironema, Ilysanthes*, etc. Koehne, Handel-Mazzetti and Pennell, who made these generic reductions, had no "prejudice" against Rafinesque's work, when understandable. Dramatic and unfounded statements have no place in real science; they belong in fiction.

If anyone has "eschewed anything from Rafinesque" it is the author of a recent monograph who has ignored all but 4 (scarcely 4 per cent) of Rafinesque's published names in the genus—these all reduced by the admirer of that "prophet" to synonymy.

(To be continued)

OVERLOOKED SPECIES, TRANSFERS AND NOVELTIES IN THE FLORA OF EASTERN NORTH AMERICA

M. L. FERNALD

(*Continued from page 21*)

SMILAX PSEUDO-CHINA L. Sp. Pl. 1031 (1753). *S. tamnifolia* Michx. Fl. Bor.-Am. ii. 238 (1803). PLATE 812.

Smilax Pseudo-China, named from resemblance to the Asiatic *Smilax China* L., the *China radix* of Bauhin, was included, along with *S. lanceolata* L., by Linnaeus in a section of the genus with unarmed terete stems. The treatment was as follows:

**Caule inermi tereti*

. . . . . .

13. SMILAX caule inermi tereti, foliis inermibus: caulinis cordatis, racemis [corrected to rameis in ed. 2] ovato-oblongis. *Pseudo China*

Smilax [misprinted Simlax] caule tereti inermi, foliis inermibus: caulinis cordatis, ramorum lanceolatis, pedunculis longissimis. *Gron. virg. 193.*

Smilax caule tereti inermi, foliis cordato-ovatis acutis inermibus, petiolis bidentatis. *Hort. Cliff. 495. Gron. virg. 120.*

Smilax virginiana, spinis innocuis armata, latis canellae foliis, radice arundinacea crassa nodosa & carnosa. *Pluk. alm. 349, t. 110. f. 5.*

Smilax aspera, fructu nigro, radice nodosa magna laevi farinacea. *Sloan. jam. 105. hist. 1. p. 231. t. 143. f. 1.*

China spuria nodosa. *Bauh. pin. 297.*

Habitat in Virginia, Jamaica.

It is at once evident that, as usual, Linnaeus had no clear understanding of American species and that his citations covered different species. The phrase "Caule inermi" of his major grouping of the primary diagnosis (of the plant he had actually before him in his own herbarium), of the quotations from Gronovius and from Linnaeus' Hortus Cliffortianus at once contrast with "spinis . . . armata" of the Plukenet reference and "Smilax aspera" of Sloane. Singularly enough, Alphonse De Candolle in his Smilacées in DC. Mon. Phan. i. 82 (1878), although saying "Linn. Sp. p. 1461 [ed. 2], excl. syn. post Gronov.", placed it, along with *S. rotundifolia, S. glauca,* etc. in the group with "Folia persistentia vel subpersistentia" and described it "aculeis in caule crebris; . . . limbis margine setaceo-ciliatis". In other words the *S. Pseudo-China,* sensu A. DC. (and many followers), not L., is *S. Bona-nox* L., which was

originally described "foliis ciliato-aculeatis." It, therefore, becomes necessary to determine what Linnaeus actually had in his own herbarium prior to 1753. Fortunately there is a characteristic sheet of foliage marked by Linnaeus "K. *Pseudo-China*". This, undoubtedly collected by Kalm ("K") in New Jersey or Delaware, is characteristic *S. tamnifolia* Michx. Fl. Bor.-Am. ii. 238 (1803). A portion of the Linnean TYPE is reproduced as our FIG. 2. The first Gronovian reference given by Linnaeus is supported by a fruiting branch in the herbarium of Gronovius at the British Museum, badly crumpled and unsightly, also by a very beautiful flowering plant (our FIG. 1). These are likewise *S. tamnifolia* with very long peduncles. The third reference, to Hortus Cliffortianus, carries back to the Plukenet figure cited by Linnaeus, which is of some woody species, presumably *S. Walteri* Pursh, since its foliage will do for that species and, in the place cited, Pluketet identified it with Virginian specimens with "baccis coccineis"; and the second Linnean reference to Gronovius is supported by a characteristic lateral sprig of flowering *S. rotundifolia!* The *Smilax aspera* of Sloane need not specially concern us, since it is so clear that the primary material, the plant which Linnaeus had in his own herbarium and the two Clayton (Gronovian) specimens with smooth stems are so definitely the true type and syntypes of *S. Pseudo-China*. The beautiful photograph sent from Paris of the type of *S. tamnifolia* Michx. is unequivocal. It is, consequently, worth noting that Michaux thought it might be the *S. caule tereti, foliis inermibus: caulinis cordatis, ramorum lanceolatis, pedunculis longissimis* of Gronovius (our FIG. 1). The point which Michaux did not note is, that this was the best syntype of *S. Pseudo-China* L. (1753).

Further showing the utter confusion of Linnaeus in interpreting North American species of *Smilax* is the fact that, although he described in his section with *Caule aculeato, tereti* a new species as *S. tamnoides* L. Sp. Pl. 1030 (1753), the specimen in his own herbarium marked *S. tamnoides* is an unusually good piece of unarmed, herbaceous-stemmed *S. Pseudo-China* (*S. tamnifolia* Michx.) while the Catesby plate, from which the characters were obviously drawn, is of a prickly-stemmed, evergreen, high-climbing and broad- and eciliate-leaved extreme of an-

other species! In fact, the specimen preserved by Linnaeus as representing his *S. tamnoides* not only has the unarmed stem, the slightly panduriform leaves, the long peduncles and loosely globose inflorescence of *S. Pseudo-China* (*S. tamnifolia* Michx.). One of its inflorescences even shows with diagrammatic sharpness the elongate-clavate styles of that species.

In my conclusion that the plants selected are the real types of *Smilax Pseudo-China* I am quite in agreement with Dr. Pennell who, in 1916, wrote:

> *Smilax Pseudo China* L. *l. c.* 1031. 1753. "Habitat in Virginia, Jamaica." Species clearly aggregate, represented in the Linnean herbarium by specimens written up by Linnaeus as follows, according to a letter of B. D. Jackson: "three sheets pinned together; the first is 'II K Pseudo China', it is a barren branch, the leaves leathery; the second sheet is written up 'II' and seems quite the same plant as the former, but has one berry, the third sheet is of a West Indian species, coll. by Patrick Browne in Jamaica, probably *S. celastroides*." From the wording of the Linnaean description none of these can be considered the type of *S. Pseudo China*, but this would be rather a specimen of Gronovius, also studied by Linnaeus, now in the Gronovian herbarium in the British Museum. The description of Linnaeus is word for word from Gronovius, except for the addition of the phase "racemis ovato-oblongis," inappropriate for any *Smilax* whatever. "Smilax caule tereti inermi: foliis inermibus, caulinis cordatis, ramorum lanceolatis; pedunculis longissimis," Gronovius, Fl. Virg. 156. 1742, citing Clayton's Nos. 541, 561 and 630, is represented in the herbarium by Nos. 561 and 630 (for No. 541 see above note under *S. herbacea*). These two numbers are identified by Dr. A. B. Rendle as both the same as No. 541, that is, as genuine *Smilax herbacea* L. For the verification of these two Linnaean types I am indebted to Dr. B. Dayden Jackson, of the Linnaean Society of London, and to Dr. A. B. Rendle, of the British Museum.—Pennell in Bull. Torr. Bot. Cl. xliii. 413, 414 (1916).

Unfortunately, Pennell did not himself see the specimens discussed; had he done so he certainly would not have reduced *Smilax Pseudo-China*, correctly typified by him, to *S. herbacea* L. He depended upon identifications by the late Drs. B. Daydon Jackson and A. B. Rendle, neither of whom clearly understood the species involved. The plant generally passing as *S. herbacea* rarely if ever has any tendency to panduriform leaves. Its leaves, varying from oblong-ovate to cordate-subrotund, are glaucous and glabrous beneath, the flowers much larger than in *S. Pseudo-China*, with the styles rather broadly lingulate, the berries glaucous. Whether the type of *S. herbacea*, from Vir-

ginia (*Clayton*), is of this species (*S. pedunculata* Muhl.) or *S. pulverulenta* Michx. can be determined only by actual (future) examination of the material. The two photographs of the specimens (one sheet in Herb. L., the other in the Gronovian Herbarium) are of identical plants. The foliage is young, but it looks green and lustrous beneath, as in *S. pulverulenta* Michx. Until the specimens can be actually studied we may retain the names *S. herbacea* and *S. pulverulenta* as currently used.

Although Pennell, l. c. 414, placed *Smilax inermis* Walt. Fl. Carol. 244 (1788), as well as *S. Pseudo-China*, in the synonymy of *S. herbacea*, rather than place them with *S. tamnifolia*, it now seems clear that Walter's species was identical with *S. Pseudo-China*. Pennell said "Type, presumably from Berkeley County, South Carolina, not verified". Walter's diagnosis was perfectly good for *S. Pseudo-China;* Berkeley County is on the outer Coastal Plain and it is notable that Pennell's only stations, in his early paper, for *S. herbacea* from Virginia (south of Fairfax County) North Carolina, South Carolina and Georgia were all from along the Blue Ridge or the Alleghenies, while he specially designated the area of *S. tamnifolia* as "Coastal Plain; Long Island to South Carolina". In the Gray Herbarium, as in those studied by Pennell, there is no so-called *S. herbacea* from the Coastal Plain from south of Virginia. Walter's *S. inermis*, "presumably from Berkeley County, South Carolina", had the weak ("infirmo") stem only 3 feet high ("tripedali"). The southernmost specimens in the Gray Herbarium of *S. Pseudo-China* are three from Berkeley County, South Carolina (Santee Canal, *Ravenel;* west of Chicora, *Godfrey & Tryon*, no. 868; Moncks Corners, *Godfrey & Tryon*, no. 1411), one from Charleston County, South Carolina (north-northwest of McClellanville, *Godfrey & Tryon*, no. 1112) and one from eastern Georgia (Savannah, *Mrs. Say*). Incidentally there are in the Gray Herbarium no specimens (not even from Wilmington) from North Carolina and Pennell saw none from that state. Is it really absent from or rare in the broad area between southern South Carolina and southeastern Virginia? This gap is frequent in the known ranges of many species.

NEMEXIS ELLIPTICA Raf. Aut. Bot. 131 (1840) with stem "6 to 12 inches high, leaves uncial", the stem with quadrate, elliptic

leaves acute at each end, from Alabama, might have been *Smilax Hugeri* (Small) J. B. Norton in Pennell in Bull. Torr. Bot. Cl. xliii. 420 (1915), based upon *Nemexia Hugeri* Small (1903). Since the combination *Smilax elliptica* already exists for other species Rafinesque's *Nemexis elliptica* need not disturb us, but by those who maintain *Nemexia* as a genus it must be considered.

Another and quite clear synonym of *Smilax Hugeri* is *S. herbacea* sensu Walt. Fl. Carol. 243 (1788), not L. His "caule annuo inerme stricto suberecto 2–5 pedali, simplici, foliis verticillatis ovatis . . . cirrhis obsoletis", etc. are unequivocal for a plant which is well known from southern and southeastern South Carolina and from Georgia.

SMILAX BONA-NOX L., var. **exauriculata,** var. nov. (TAB. 811, FIG. 3), foliis oblongo-lanceolatis subacuminatis basi cordatis nec panduriformibus, margine setoso-ciliatis.—VIRGINIA: Norfolk, *Reed*? (TYPE in Herb. Gray.).

S. BONA-NOX, var. **hederaefolia** (Beyrich), comb. nov. *S. hederaefolia* Beyrich ex Kunth, Enum. v. 209 (1850). *S. Bona-nox*, subsp. *hederaefolia* (Beyrich) A. DC. in DC. Mon. i. 77 (1878).

As it extends northward into eastern Virginia (more locally northward) *Smilax Bona-nox* is nearly as variable as farther south. In this northeastern area of its broad dispersal it occurs in three (perhaps four) quite definite variations. Typical *S. Bona-nox* L. Sp. Pl. 1030 (1753) was, most exceptionally, not so much confused as most of Linnaeus's North American species. Although he included a West Indian shrub of Bauhin, he gave the "*Habitat in* Carolina" and the species rests primarily on *Smilax, foliis latis in margine spinosis, caroliniana, stipite quadrato*, Pluk. Alm. 348, t. 111, fig. 3; the Linnean diagnosis drawn directly from Plukenet: "SMILAX caule inermi [because Plukenet had merely a sterile tip] angulato, foliis ciliato-aculeatis." Typical *S. Bona-nox*, therefore, is the slender, straggling and rarely climbing, freely branched shrub with deltoid-ovate to slightly panduriform leaves usually mottled with white, the rounded basal lobes short and tapering into the upper part of the blade, the margins bristly-ciliate. Its northern limit seems to be in Wicomico County, Maryland (*J. J. Carter* in Herb. Phil. Acad.).

Linnaeus picked up another of Plukenet's figures. This was *S. Bona-nox* β. of L. Sp. l. c. "Smilax caroliniana, stipite quadrato leni, foliis angustis asperis auriculatis ad basin angulosis. *Pluk. alm.* 348, *t.* 111. *f.* 3." Somewhat later this was taken up as a species: *S. hastata* Willd. Sp. iv². 782 (1806), Willdenow emphasizing the point shown by Plukenet, that the very narrow leaves are "margine ciliato-aculeatis". This extreme with narrowly lanceolate bristly-ciliate blades with narrow divergent basal lobes occurs occasionally in the Carolinas and southward. The Virginia material is slightly transitional but may be called *S. Bona-nox,* var. *hastata* (Willd.) A. DC. in DC. Mon. i. 79 (1878).

The third variety with strongly bristly-ciliate leaves is the very extreme plant described above as var. *exauriculata.* The type material is an old sheet from Norfolk, collected probably by Reed who got in the neighborhood of Norfolk several species otherwise and not recently known from Virginia. Var. *exauriculata* is very extreme in having elongate oblong-lanceolate, tapering, ciliate-margined leaves with nearly parallel sides and cordate (not hastate or subhastate) bases. It piques the curiosity! The specimen was sent out as *S. hastata,* var. *lanceolata* Pursh. It can hardly be that, however. Pursh gave no new description; he was simply giving a name to the *S. lanceolata* Walt., perhaps not L.: "caule angulato spinoso; foliis longis angustis lanceolatis inermibus". Var. *exauriculata* could not be described "foliis inermibus". I am tentatively placing with it a sheet from dry bank, Santee Canal, 5 miles west of Pineville, Berkeley County, South Carolina, *Godfrey & Tryon,* no. 630 (distrib. as *S. glauca*). Its leaves are chiefly oblong, rather than lanceolate.

The extreme of *Smilax Bona-nox* with "foliis inermibus" is a coarse and usually high-climbing shrub with ovate, deltoid or broadly panduriform leaves usually green above and with eciliate or very weakly and casually ciliate leaves on the fertile branches. Basal sprouts may have ciliate and mottled leaves but the foliage of the adult branches is rarely so. This often high-climbing vine has the leaves up to 8 (on sprouts to 12) cm. broad and in good development is very different from typical *S. Bona-nox.* It is var. *hederaefolia,* which rests on *S. hederaefolia* "Beyrich ined." ex Kunth (1850), treated by Alphonse DeCandolle as *S. Bona-nox,* subsp. *hederaefolia.* Beyrich's

original material was from shores of Savannah River, Georgia. To this citation DeCandolle added "Virginia (Rügel . . .)". Var. *hederaefolia* is the commonest extreme of the species. In southeastern Virginia it abounds on damp shores or in low woods, the typical form of the species preferring open and drier habitats. Var. *hederaefolia* reaches Delaware (*A. Commons* in Herb. Phil. Acad.) and is isolated on Nantucket Island in southeastern Massachusetts.

Smilax tamnoides L. Sp. Pl. 1030 (1753) was another species not understood by its author. His species rested upon two items: the first a specimen of the unarmed herbaceous plant which on the next page he described as *S. Pseudo-China*, the plant which has regularly passed as *S. tamnifolia* Michx. The second and sure basis of *S. tamnoides* was the description and plate of *Smilax Bryoniae nigrae* foliis, caule spinoso, baccis nigris of Catesby, Carol. i. 52, t. 52. Linnaeus took his brief diagnosis primarily from Catesby: "SMILAX caule aculeato tereti" and the species was placed by him in the section **Caule aculeato, tereti.* There can be no question that the type of *S. tamnoides* was the Catesby plate.

Catesby's description was vivid:

> This plant shoots forth with many pliant thorny stems; which, when at full bigness, are as big as a walking cane, and jointed; and rises to the height usually of twenty feet, climbing upon and spreading over the adjacent Trees and shrubs. . . . In Autumn it produces clusters of black round berries, hanging pendant to a foot-stalk, above three inches long," etc.

The only possible competitor is *S. Bona-nox*, var. *hederaefolia*, but that has square or at least 4-angled stems (Catesby's shrub terete), the leaves are strongly reticulate with prominent cross-veins (Catesby's not), and the fruiting peduncles are 1–3 cm. long, merely ascending to divergent or rarely recurved (Catesby's shrub with pendulous fruiting peduncles 5–6 cm. long, with pedicels much longer than in *S. Bona-nox*). Catesby's plate is a beautiful match for the terete-stemmed plant, with relatively thin though firm, and delicately veined often panduriform leaves, elongate, arching and finally drooping peduncles (up to 6.5 cm. long) and long pedicels, which occurs on the Coastal Plain from Florida to southeastern Virginia (perhaps farther north). This plant has been considered a variety of the wide-ranging, conti-

nental *S. hispida*, from which it differs in the development of some or many panduriform leaves. It has been designated in the Gray Herbarium by a critical student of the group as a southeastern variety of *S. hispida*, with an unpublished name indicative of its southern occurrence. In the Gray Herbarium there is no material of *S. tamnoides*, var. *hispida*[1] (*S. hispida*), the continental plant with leaves regularly ovate, from the Coastal Plain south of Virginia, where it extends from the interior down the calcareous valleys. All specimens from the Coastal Plain of Florida, Georgia and South Carolina have some or all of the leaves panduriform and are typical *S. tamnoides*. I have seen no such material from North Carolina.

Pursh, treating *Smilax tamnoides* as herbaceous (meaning *S. tamnifolia* Michx.) described as *S. pandurata* [he said *us*] Pursh, Fl. Am. Sept. i. 251 (1814), a species in his ***Caule fruticosa; ramis teretibus*. Pursh's brief description could have applied only to typical *S. tamnoides*:

14. S. aculeata; foliis ovato-panduraeformibus acuminatis 3-nervibus, pedunculo communi petiolo duplo longiore. *panduratus.*
In sandy woods, New Jersey to Carolina. ♄. July.
v.v. Leaves smooth and shining on both sides.

NOTE ON SMILAX LANCEOLATA.—*S. lanceolata* L. Sp. Pl. 1031 (1753) was published as follows, under **Caule inermi, tereti:*

12. SMILAX caule inermi tereti, foliis inermibus lanceolatis.
Hort. Cliff. 459. *Gron. virg.* 120.
Smilax, viticulis asperis, virginiana, foliis angustis laevibus nullis auriculis praedita. *Pluk. alm.* 349 *.t.* 110. *f.* 4? *Raj suppl.* 344?
Habitat in Virginia.
Differt *nostra a Plukenetiana aculeorum absentia.*

Linnaeus himself, according to the late Dr. B. Daydon Jackson, had no material and my efforts to secure a photograph of the Hortus Cliffortianus and Gronovian plants have been unsuccessful. The Plukenet figure, cited by Linnaeus in *Hortus Cliffortianus* without query, is available and it is significant that Linnaeus stated that *S. lanceolata* differed from Plukenet's figure in lacking prickles. It should also be noted that *S. lanceolata* was from

[1] SMILAX TAMNOIDES L., var. **hispida** (Muhl.), **stat. nov.** *S. hispida* Muhl. ex Torr. Fl. N. Y. ii. 302 (1843).

Virginia. During ten seasons in the field my companions and I have sought, in vain, for the familiar rather thin-leaved plant with 3 stigmas and dark red berries which regularly passes as *S. lanceolata*. This species occurs in our extreme Southern States, Florida to Texas, north into South Carolina and Arkansas. I have seen no specimens of it from north of South Carolina. Everywhere in southeastern Virginia the coriaceous-leaved, evergreen *S. laurifolia* L. occurs, varying tremendously, with leaves from elliptic-oblong to narrowly lanceolate, obtuse to acuminate, the blades anywhere from 0.6–2 dm. long and 1–7.5 cm. wide. But it is always *S. laurifolia*, with intermittent tendrils, flowers expanding in autumn, black fruit ripening the second year, stigma and seed 1, etc. In its narrowest-leaved extreme, such as *Fernald & Long*, nos. 6778 and 13,919, its leaves are narrowly lanceolate and very close to those of the Plukenet figure. Of two sheets of one number retained at the Gray Herbarium, one has the branches as fiercely prickly as in Plukenet's illustration, while the second has them prickleless, as described by Linnaeus. Furthermore, the Plukenet figure is quickly matched by vigorous, prickly, narrow-leaved vegetative sprouts. It is most difficult for one who knows southeastern Virginia to believe that the plant inadequately described by Linnaeus as *S. lanceolata* was anything but the narrowest-leaved *S. laurifolia*, the type of which, as shown by the photograph before me, was the broad-leaved phase of the species.

Of great importance in interpreting the confused ideas of Linnaeus is the fact, that in *Species Plantarum*, after citing the reference to his brief account in *Hortus Cliffortianus* (which was based wholly or in part on the Plukenet figure) he appended "*Gron. virg.* 120." Now, if one looks in Gronovius he will find *Smilax* treated on pp. 120 and 193. On p. 120 two species have completed treatments, the third treatment was unfinished (as printed) and as an erratum was given on p. 193, "*Ibidem linea penultima lege.*" The first species on p. 120 had cordate-ovate leaves and was cited by Linnaeus under his *S. Pseudo-China*. Gronovius included under it "Smilax humilior, floribus dilute luteis, baccis rubris. *Clayt. n.* 82", which is, of course, *S. Walteri* Ell. (photograph of the Clayton plant before me). The second species in Gronovius, on p. 120, had "caule angulato

aculeato, foliis dilatato-cordatis" and included "Smilax late scandens Bryoniae nigrae foliis, caule spinoso . . . baccis atro-purpureis. *Clayt. n.* 81"; i. e., with angulate stems, leaves of Bryony and purple-black berries, it was one of the variations of *S. Bona-nox* L., surely not the red-berried so-called "*S. lanceolata*". The third species, revised on p. 193, with the admonition to substitute for the account on p. 120, was

> *SMILAX caule spinoso tereti: foliis ovato-oblongis, trinerviis, inermibus.*
> Smilax laevis Lauri folio, baccis nigris. *Catesb. Hist. Carol. Vol. I. T. 15.*
> Smilax sempervirens Lauri folio crasso: floribus parvis herbaceis; caule spinis rigidissimis armato; baccis nigricantibus. *Clayt. n. 617.*

Smilax laevis Lauri folio of Catesby was the best kind of *S. laurifolia* L.; in fact it was cited by Linnaeus in publishing that species. So too was the *Smilax caule spinoso tereti* (with his own changes to "caule aculeato tereti", etc.) of Gronovius, p. 193. These, in fact, were the only bases of *S. laurifolia* L. (1753). Surely, there is not much left to stand for *S. lanceolata* L. as a distinct species! One sometimes doubts the wisdom of starting our nomenclature of American plants with Linnaeus (1753). It is almost an exceptional North American species about which he was not hopelessly confused.

As pointed out by Morong, Bull. Torr. Bot. Cl. xxi. 434 (1894), Asa Gray, thinking of *Smilax lanceolata* in the usually accepted but obviously erroneous sense, as the southern, thinnish-leaved plant with 3 stigmas and dark red 3-seeded berries, "examined in 1881 the specimens in the Herbaria of Enslen and Sherard upon which Pursh founded his species [*S. ovata* Pursh, Fl. Am. Sept. i. 249 (1814)], and declares positively that they are *Smilax lanceolata*". *S. lanceolata* sensu Gray, Morong, Small and others is, then, *S. ovata* Pursh, whose description was good except for "berries black". In the herbarium they always lose their red color. Unfortunately, however, *S. ovata* Pursh (1814) is antedated by a different *S. ovata* Jaume St.-Hilaire (1800).

The first available name for *Smilax ovata* Pursh, not Jaume St.-Hilaire, seems to be S. Smallii Morong in Bull. Torr. Bot. Cl. xxi. 434 (1894). Morong described it from young flowering branches, with staminate flowers only, but a very full sheet of isotypic material before me is surely of the shrub erroneously passing as *S. lanceolata*. Small himself, in his Manual, reduces

to *S. lanceolata* sensu authors, not L., both *S. Smallii* Morong and *S. cinnamomifolia* Small in Bull. Torr. Cl. xxv. 609 (1898), the latter described as having "bluish-black" berries. In his Manual, where he reduces *S. cinnamomifolia*, the berries are called "dull-red". The type of *S. cinnamomifolia, Heller,* no. 4109, from Arkansas, was in ripe fruit. The isotype in the Gray Herbarium shows the crushed berries darkened, just as are the crushed and dried fruits of the admittedly red-berried shrub.

Until *Smilax Smallii* (*S. lanceolata* sensu most auth., not L.) is really collected in Virginia it may safely be excluded from the flora of the state.

FOUR OF RAFINESQUE'S SPECIES OF SISYRINCHIUM.—In his Autikon Botanikon (Cent. V), 65 and 66 (1840) Rafinesque, with the unusual clarity which contrasted much of his work in this rare volume with the slipshod technique of most of his publications, described four species of *Sisyrinchium.* Since these were overlooked by Bicknell in his detailed study of the genus and find no mention in current floras, it is desirable to note their probable identities. The original descriptions are copied below.

481, SISYRINCHIUM *flexuosum* Raf. caule dichot. flexuoso anceps, fol. brevis ensatis acutis vix nervosis, spathis lanc. diphylis ineq. fl. subeq. 3–4fl. capsulis ovoideis truncatis torulosis—Arkanzas and Texas, semipedal, leaves 1 or 2 inches, specimens in fruit only.

482, *Sisyr. tenuifolium* Raf. caulib. cespitosis genicul. filif. 2ang. fol. tenuis angustissimis elong. lin. filif. acutis, spathis 2valvis subeq. lanceol. fl. brevior 2–5fl. petalis obt. cuspid. capsulis globosis—Arkanzas and Texas, annual semipedal, leaves 2–4 inches long very slender, fl. blue, larger than in S. anceps.

483, *Sisyr. floridanum* Raf. Scaposum, fol. lin. lanc. acutis vix nervosis, scapis fol. subeq. lato bialatis, spathis ineq. bivalvis lanc. 2–4floris equante, petalis retusis cuspidatis, caps. obovatis—Florida, found by Baldwin, 4 to 6 inches high, annual leaves 2–4 inches, one line broad, flowers large white.

484, *Sisyr. niveum* Raf. scaposum fol. lin. angustis striatis nervosis acutis, scapis fol. longior bialatis, alis striatis, spathis sepe coloratis 3valvis, 2int. brevis subeq. 1 ext. longissima lanc. plicata, 6–8floris. petalis retusis cuspid. capsulis globosis—Alab. Kentucky &c, 6 to 8 inches high, leaves 3 to 5, half line wide, flowers size of S. anceps, snowy white, spathas more or less colored of red.

Species no. 481, *Sisyrinchium flexuosum* Raf., not Spreng. (1825), is undoubtedly *S. minus* Engelm. & Gray in Bost. Journ. Nat. Hist. v. 263 (1845). The description might well have been based on the type of *S. minus*, and the description of *S. minus* in

Small's Manual emphasizes the short leaves (2–7 cm. long) and the capsule "corrugated". Rafinesque said "capsulis . . . torulosis." Although *S. flexuosum* Raf. was the earliest name for this southwestern species, it was antedated by *S. flexuosum* (L.) Spreng. S. MINUS stands.

Species no. 482, *S. tenuifolium* Raf., suffers the same fate. Rafinesque gave a good diagnosis of *S. Langloisii* Greene, Pittonia, iv. 32 (1899). Compare with Rafinesque's diagnosis these phrases from Greene's description of *S. Langloisii:* "Densely tufted and very slender . . . : leaves very narrowly linear, 2 to 4 inches long . . . : stems scarcely ancipital, rather subterete [Raf. said "filif."] . . . , . . . peduncles each with a single small few-flowered spathe, its bracts equal or nearly so . . . : . . . perianth large for so small a plant, blue." Characteristic plants of *S. Langloisii* closely match the account of *S. tenuifolium.* Rafinesque, however, was again out of luck, for there was an earlier *S. tenuifolium* Humb. & Bonpl. ex Willd. (1809). S. LANGLOISII stands.

Species 483, *S. floridanum* Raf., is more puzzling, on account of its large "white" flowers, for, so far as I can make out, no regularly white-flowered species occurs in Florida, unless possibly *S. albidum* Raf. Atl. Journ. 17 (1832). The "scapis . . . lato bialatis", their height and the leaves 1 line broad would do for *S. albidum.* It may so rest for the present. *S. floridanum* Raf. (1840), however, invalidates the name *S. floridanum* Bickn. in Bull. Torr. Bot. Cl. xxvi. 222 (1899), given to a very slender and pale plant first collected by Nash in high pineland of Lake County, Florida. Various coarser and darker-drying plants probably referable to *S. arenicola* Bickn. (incl. *S. fibrosa* Bickn.) have been wrongly distributed as *S. floridanum*, but an ISOTYPE (*Nash*, no. 13) and such material as *Blanton*, no. 6952 stand clearly apart. Since there is already a *S. Nashii* Bickn. his *S. floridanum* may appropriately be called

SISYRINCHIUM **Bicknellianum,** nom. nov. *S. floridanum* Bickn. in Bull. Torr. Bot. Cl. xxvi. 222 (1899), not Raf. Aut. Bot. 66 (1840).

Rafinesque's species no. 484, *S. niveum* from Alabama and Kentucky, can scarcely be anything but his already described *S. albidum* Raf. Atl. Journ. 17 (1832).

Quercus incana Bartram, Trav. 378 (1791). *Q. cinerea* Michx. Fl. Bor.-Am. ii. 197 (1803).

I fully concur in the decision of Dr. Francis Harper in Bartonia, no. 22: 3 (1943), that *Quercus incana* is *Q. cinerea*. Bartram's description was very brief: "Q. incana, foliis ovalibus integerrimis subtus incanis." Bartram was describing the trees and shrubs of high gravelly ridges of the upper Ogeechee River in central-eastern Georgia: "This day's journey was for the most part over high gravelly ridges, and on the most elevated hills appeared emerging out of the earth, rocky cliffs of a dark reddish colour; their composition seemed to be a coarse, sandy, ferruginous concrete . . . The trees and shrubs common on these gravelly ridges are as follows, Diospyros, Quercus rubra [meaning *falcata*], Q. nigra, Q. tinctoria or great Black Oak, Q. alba, Q. lobata, post White Oak, Q. incana, . . . Pinus lutea, Pinus taeda, . . . Pinus palustris", etc., a rather characteristic group of oxylophytic and more or less xerophytic species. These are the regular associates of *Quercus cinerea*, a characteristic species of dry sands and gravels, which, according to R. M. Harper, *Phytog. Sk. Altamaha Grit Reg. of Ga.* Ann. N. Y. Acad. Sci. xvii. pt. I. 249 (1906), "Ranges from the fall-line sand-hills [near Bartram's station] almost to the coast". Ordinarily the leaves of *Q. cinerea* are oblong, but they vary to oval or elliptic in broader-leaved individuals (Small says, "blades elliptic, varying to lanceolate or oblanceolate . . . Sand-ridges, dry woods, and pinelands.")

Trelease, *The American Oaks*, Mem. Nat. Acad. Sci. xx. 113 (1924), guessed that *Q. incana* Bartr. is the Live Oak, *Q. virginiana* Mill., but Bartram was thoroughly familiar with Live Oak; in fact he mentioned it more often than any other species and would not suddenly, in describing the characteristic covering of the inland Sand Hills, proceed to describe it as a novelty. *Quercus virginiana*, the true Live Oak, so familiar to Bartram, is, from Virginia to Georgia, an evergreen tree primarily of the outermost Coastal Plain. Harper, op. cit., did not know it on the Altamaha Grit which, at its northern boundary, approaches Bartram's station of *Q. incana*. The only representative of *Q. virginiana* in Harper's area is *Q. geminata* Small, which Bartram would have included under *Q. virginiana* and which is

found only well to the south of Bartram's area and in a different soil. So far as I can find, *Q. cinerea* is the only species of the "fall-line sand-hills" which Bartram could have meant by *Q. incana*.[1]

QUERCUS MARITIMA Bartr. Trav. 164 (1791). From the "endless wild desert, the upper stratum of the earth of which is a fine white sand, with small pebbles, and at some distance appears entirely covered with low trees and shrubs of various kinds, and of equal heighth", along St. John's River north of Lake George, eastern Florida. From the description alone, "foliis obcuneiformibus obsolete trilobis minoribus", I do not venture to guess its identity. Too many shrubby species of Florida are candidates. Bartram's *Q. maritima* (1791), however, antedates *Q. maritima* (Michx.) Willd. (1805) and Raf. (1838). The last two were caught by *Index Kewensis*, the earliest of the series not.

SILENE SCABRA Raf. Aut. Bot. 18 (1840), from "barrens of West Kentucky", is very definitely S. REGIA Sims (1814). Rafinesque's name, moreover, is invalidated by *S. scabra* Kit. (1814).

PRUNUS NEMORALIS Bartr. Trav. 408 (1791) should be added to the synonymy of *Padus caroliniana* Mill. Dict., no. 6 (1768) and of PRUNUS CAROLINIANA (Mill.) Ait. Hort. Kew. ii. 163 (1789).

Bartram's species, not entered in Index Kewensis, was from above Mobile, Alabama: "Prunus nemoralis, floribus racemosis, foliis sempervirentibus, nitidis."

SEBASTIANIA **fruticosa** (Bartram), comb. nov. *Stillingia fruticosa* Bartr. Trav. 476 (1791). *Stil. ligustrina* Michx. Fl. Bor.-Am. ii. 213 (1803). *Sebastiania ligustrina* (Michx.) Muell.-Arg. in DC. Prodr. xv.[2] 1165 (1866).

Index Kewensis cites *Stillingia fruticosa* as starting with Spreng. Syst. iii. 805 (1826), while Sprengel credited it to Michaux (1803) who had no such name but described *Stil. ligus-*

[1] Even though some might doubt this interpretation of *Q. incana* Bartr. (1791) they can hardly doubt its priority over *Q. incana* Roxb. Hort. Beng. 104 (1814) and Fl. Ind. iii. 642 (1832). The Indian species should, apparently, be called *Q. lanata* Sm. in Rees Cycl. xxix. no. 27 (1819).

trina from "sylvarum umbrosis, ad ripas amnium Carolina et Georgia." Bartram, however, describing the "very curious and beautiful flowering and sweet scented shrubs" northwest of Cape Fear, North Carolina (near Wilmington), enumerated many of them: "particularly Callicarpa, Aesculus pavia, . . . Styrax, Stewartia, . . . Stillingia fruticosa, foliis lanceolatis, utrinque glabris, fructu tricocco". Though brief, the diagnosis of this characteristic shrub of the Coastal Plain, northward to southeastern North Carolina, is sufficient. M. A. Curtis in his Catalogue of the Indigenous and Naturalized Plants of North Carolina (1867) cited *Stil. ligustrina* as occurring in the "Low Dist.", *i. e.* on the Coastal Plain, and Wood and McCarthy in their Wilmington Flora, covering the country drained by both the Northeast and the Northwest Cape Fear Rivers, also listed it. In both lists the species is recorded on the authority of Dr. *J. F. McRee*, who was born at Wilmington and later had a plantation some miles north of that city.

CYRILLA RACEMIFLORA L., var. **subglobosa,** var. nov. (TAB. 813, FIG. 1 et 2), foliorum venis subtus vix prominulis; sepalis ovatis 1 mm. longis; fructibus depressis subglobosis sulcatis; stigmatibus perbrevibus.—VIRGINIA: wooded swamp along Mill Creek, about 1 mile north of Skipper's, October 14, 1938, *Fernald & Long*, no. 9600 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

Typical *Cyrilla racemiflora* has a characteristic conic-ellipsoid or -ovoid drupe definitely longer than broad, though in exceptional specimens only slightly longer. In ripe material the drupes (FIG. 3) show a continuous rounded surface with little or no sign of furrowing and the styles and stigmas are rather prominent, the lanceolate to lance-ovate sepals are 1–1.8 (usually 1.5) mm. long, their sharp tips evident beyond the half-diameter of the fruit. In typical *C. racemiflora*, furthermore, the mature foliage is usually prominently reticulate-veiny beneath. Var. *subglobosa*, the type in ripe fruit, collected in mid-October, has the reticulum of the lower, as well as the upper, leaf-surface rather faint; the sepals are the shortest in the species, 1 mm. long and ovate; and the depressed-subglobose drupes (FIGS. 1 and 2), definitely as broad as or broader than high, so that the sepals are relatively hidden, are broadly rounded to an almost emarginate summit and with a deep longitudinal furrow running

from base to apex and marking the boundaries of the 2 carpels; the style and stigmas are the shortest in the species.

Although occasional specimens of the wide-ranging and more typical *Cyrilla racemiflora* approach in one character or another the shrub from near Skipper's, the latter combines so many of these exceptional characters that I am designating it as a variety. Flowering material may show other differences.

In shape of drupe Var. *subglobosa* suggests the fruit described by Rafinesque for his *Cyrilla polystachya* Raf. Aut. Bot. 8 (1840), with "capsulis subglobosis". That shrub of Louisiana and Florida was described, however, as having the "fol. . . . imis . . . acutis . . . racemes 6 to 8 inches". It is most probably a phase of the narrow-leaved and small-fruited *C. parviflora* Raf., l. c., which differs in several characters from *C. racemiflora*.

In PLATE 813, FIGS. 1 and 2 are of TYPE of CYRILLA RACEMIFLORA L., VAR. SUBGLOBOSA: FIG. 1, portion of branch, × 1; FIG. 2, portion of fruiting raceme, × 5. FIG. 3 is a portion of a fruiting raceme of typical C. RACEMIFLORA, × 5, from west of Winfield's Mill, Dinwiddie County, Virginia, *Fernald & Long*, no. 13970.

AESCULUS SYLVATICA Bartr. Trav. 476 (1791). *Ae. neglecta* Lindl. Bot. Reg. xii. t. 1009 (1826); Sargent in Journ. Arn. Arb. v. 43 (1924).

The tree known as *Aesculus neglecta* is characteristic of woodlands along streams in central and eastern North Carolina and southeastern Virginia. In the latter state it reaches the inner border of the Coastal Plain along the Meherrin River, below Emporia. From North Carolina Sargent cites specimens from the Piedmont eastward to the fall-line sand-hills or the inner margin of the Coastal Plain: Alamance, Orange, Durham and Wake Counties, on Cape Fear drainage or (the Wake County station) on the Neuse. According to Lindley's original account and plate the flowers are cream-colored or pale-yellowish, "and beautifully veined with red; the lateral petals are also pinkish". The red and pink coloring may sometimes be nearly absent but the non-glandular pedicels and calyx, which characterize the species, hold. Bartram, ascending "the North West of Cape Fear" River, found "Aesculus sylvatica, floribus ex albo et carneo eleganter variegatis, caule arboreo". What else could it have been than *Ae. neglecta*, with "flowers . . . beautifully

veined with red", the species characteristic of eastern North Carolina and adjacent Virginia, South Carolina and Georgia, which Sargent cites from definite stations on Cape Fear River? The name was not recorded in Index Kewensis.

Neither did Index Kewensis pick up *Aesculus floridana* Bartram, l. c. 401 (1791) from northern Florida, described: "Aesc. Florid. ramis divaricatis, thyrsis grandis, flosculis expansis incarnatis." What he had I do not know. He was definitely distinguishing it from *Ae. Pavia* which he enumerated in the same list. If the latter species is ever subdivided Bartram's species must be taken into account.

VITIS CAMPESTRIS Bartram, Trav. 400 (1791), not Nutt. in Fraser's Cat. (1813) nor Baker in Mart. Fl. Bras. xiv^2. 200 (1871). *V. rotundifolia* Michx. Fl. Bor.-Am. ii. 231 (1803).

Vitis rotundifolia, the Muscadine, and its pale-fruited form, the Scuppernong, are among the most familiar and most prized wild grapes of the Southeastern States. When fully ripe the large grapes are intensely sweet and are harvested in great quantities for preserving. Unlike the great majority of our grapes, this species has few and simple tendrils, instead of many and forking ones. Consequently, although it may climb high when opportunity presents, it is most often sprawling over bushes or reclining on the sand or gravel, so that, in such habitats, its often too tempting and almost over-sweet berries are gathered by stooping. Thus, Elliott said: "This species of vine varies much in size, sometimes ascending the loftiest trees, more frequently humble" (Sk. ii. 687) and Darby said "sometimes not climbing". As to the fruit, Mohr (Pl. Life Alab. 6: 3), pays it the compliment which he accords no other species of Alabama: "Important as a table and wine grape" and, after speaking of the "Berries large, plum-purple", he adds: "Plants of spontaneous growth have been observed near Mobile bearing light amber-colored berries."

Bartram's party, crossing northern Florida en route to Mobile, where "Our road now for several miles led us near the Alabama", eventually left "the Alabama bearing away Southerly, and enter[ed] a vast open forest which continued above seventy miles, East and West, without any considerable variation . . . During our progress over this vast high forest, we crossed extensive open plains, the soil gravelly, producing a few trees and

shrubs or undergrowth, which were entangled with Grape vines (Vitis campestris) of a peculiar species [*Vitis rotundifolia* Michx. is so "peculiar" in many characters that Small makes it a separate genus, *Muscadina*], the bunches (racemes) of fruit were very large, as were the grapes that composed them, though yet green and not fully grown, but when ripe are of various colours, and their juice sweet and rich. The Indians gather great quantities of them, which they prepare for keeping, by first sweating them on hurdles over a gentle fire, and afterwards dry them on their bunches in the sun and air. and store them up for provisions: these Grape vines do not climb into high trees, but creep along from one low shrub to another, extending their branches to a great distance horizontally round about [Bailey, Gent. Herb. iii. 238, says of *V. rotundifolia* "climbing to 100 feet over bushes and trees"], and it is very pleasing to behold the clusters pendant from the vines, almost touching the earth, indeed some of them lie upon the ground." I have many times gathered from near the ground or from the surface of sand-hills or dunes and eaten more than my fill of the "very large . . . grapes [Michaux described his *V. rotundifolia* baccis magnis"], . . . their juice sweet and rich" of *V. rotundifolia*. Not only did the Indians of northwestern Florida and of Alabama gather and dry the large and sweet grapes "and store them up for provisions." Their successors in occupation of the region continue the custom, with obvious refinements. In his Nature's Garden for Victory and Peace, revised (Bull. Tuskegee Inst. Alab. no. 42), the late Dr. George W. Carver, ignoring the other 5 (and sour-fruited) species of *Vitis*, concentrated on the Muscadine, giving explicit directions for cleaning and preparing the fruits, after which "They may be dried whole or made into a leather . . . I much prefer the leather . . . of a fine flavor . . . I wish every housewife would try this." To those who intimately know the Muscadine and the Skuppernong, their growth-habit and fruit there can be no serious question that *V. campestris* Bartr. (1791) is the same as *V. rotundifolia* Michx. (1803). The change of name would have been made a half-century ago if Bartram's species had not been ignored by the editors of Index Kewensis.

AMMANNIA TERES Raf. Aut. Bot. 39 (1840). *A. Koehnei* Britton in Bull. Torr. Bot. Cl. xviii. 271 (1891).

Rafinesque certainly had the plant of fresh to brackish tidal shores of Virginia to Florida (once in the Hackensack marshes of New Jersey) which Britton described as *Ammannia Koehnei*.

Rafinesque's description was good:

296, *Am. teres* Raf. caule teres vix ramoso fol. obl. obt. carnosis, caulinis basi cord. ad medio. angustatis, rameis cuneatis brevis, fl. sepe solit—Virg. ad Carol. pedal, leaves twice as broad as in last, broader at both ends.

This necessitates the new combination:

A. TERES, var. **exauriculata** (Fernald), comb. nov. *A. Koehnei*, var. *exauriculata* Fernald in RHODORA, xxxviii. 437, tab. 449, figs. 4 and 5 (1936).

The "last", referred to above by Rafinesque, was his AMMANNIA MULTICAULIS, l. c. (1840). This was evidently *Rotala ramosior* (L.) Koehne, with the virgate stems simple, "fol. linearib., acutis, fl. sepe vertic—Virginia, pedal, leaves uncial", while no. 294, A. LINEARIFOLIA, cited as the same as *A. ramosa* of authors, but with "fol. linearib. obt. nonnulis basi dilatatis" was ROTALA RAMOSIOR, var. INTERIOR Fern. & Grisc.

A. LONGIFOLIA Raf. l. c. (1840) from its excellent description and the region, "Arkanzas and Louisiana," was A. COCCINEA Rottb. (1773); and A. DIFFUSA Raf. l. c. (1840) is apparently A. AURICULATA Willd. (1806).

None of these species of Rafinesque are recorded in Index Kewensis.

HERACLEUM MAXIMUM Bartr. Trav. 344 (1791). *H. lanatum* Michx. Fl. Bor.-Am. i. 166 (1803).

It is with real sadness that I seem forced to relinquish so long established and familiar a name as *Heracleum lanatum* Michx. But the species, which in the East extends south along the mountains to Georgia (*Small*), was detected by Bartram in the mountains of northwestern Georgia and briefly but passably described: "I observed growing in great abundance in these mountain meadows, Sanguisorba Canadensis and Heracleum maximum, the latter exhibiting a fine shew, being rendered conspicuous even at a great distance, by its great height and spread, vast pinnatified leaves and expansive umbels of snow-white flowers." We are sorry to give up the long established name; we should have been familiar with Bartram's earlier one had it been picked up, as were several names in the same book,[1] in

[1] Such names as *Anona pygmaea*, basonym of *Asimina pygmaea* (Bartr.) Gray; *Andromeda formosissima*, *Stewartia montana*, etc

Index Kewensis. Incidentally, the type of *Heracleum lanatum* consists of a portion of leaf of the *Heracleum* and a fruiting umbel of *Pastinaca sativa!*

THE PLANTS PASSING AS PHACELIA HIRSUTA (PLATES 814–816).

PHACELIA **fallax,** sp. nov. (TAB. 814), a *P. hirsuta* differt foliorum caulinorum lobis terminalibus cuneato-obovatis segmentis oblongo-obovatis; caulibus pedicellisque minutissime pilosis strigosisque; sepalis adscendentibus deinde tuberculato-ciliatis extus glabris vel glabratis intus glabris; seminibus transverse lineato-rugosis.—Mountain-region, western Virginia to Georgia. VIRGINIA: Giles County, May, 1869, *Canby.* GEORGIA: Stone Mountain, May, 1869, *Canby*, May 13, 1897, *Biltmore Herb.*, no. 4263, May 3, 1899, *Canby & Sargent*, May 24, 1899, near summit, *A. H. Curtiss*, no. 6458 (TYPE in Herb. Gray.), April 16, 1932, thin soil on slope, *E. J. Palmer*, no. 39,909; slope of Pine Mountain, 1 mile north of Lithonia, April 28, 1934, *Perry & Myers*, no. 998.

Phacelia fallax has been mistaken for *P. hirsuta* Nutt. in Trans. Am. Phil. Soc. v. 191 (1837), our PLATE 815, FIGS. 1–3; and Brand in Engler, Pflanzenr. iv[251]. 65 (1913) gave under the name *P. hirsuta* a description of *P. fallax*, based exclusively on the plant of Stone Mountain (the Biltmore and the Curtiss exsiccatae), Brand specially emphasizing the tuberculate-based cilia of the sepals and the broad lobing of the leaves and saying: "Von anderern Standorten nicht gesehen. Gray gibt die Pflanze ferner an für M i s s o u r i bis O s t t e x a s." The latter, the region from which Brand saw no material, is the real area of *P. hirsuta* Nutt. Nuttall's species is definitely HIRSUTE; the TYPE or ISOTYPE (PLATE 815, FIG. 1) in the Gray Herbarium closely matches the original description of the species which came from "sylvan prairies" in Arkansas, in having the summit of the stem and the pedicels spreading-hirsute, the "pectinately-pinnatifid" leaves with linear segments, and the sepals during anthesis widely spreading. It is matched by a few collections from Arkansas, Oklahoma and eastern Texas; and Mr. Long sends me for checking a characteristic specimen, collected as an adventive, near Telford, Pennsylvania, June 14, 1901 by Dr. *C. D. Fretz.* The contrasts between the two species are given below and in PLATES 814 and 815.

P. HIRSUTA: principal cauline leaves deeply or pectinately pinnatifid, with linear to linear-lanceolate segments; summit of stem and pedicels spreading-hirsute as well as pilose; sepals during anthesis widely spreading to slightly reflexed, later ascending, their margins ciliate-hirsute with mostly slender-based hairs, the upper surfaces strigose. PLATE 815, FIGS. 1–3.

P. FALLAX: principal cauline leaves with terminal cuneate-obovate lobe rarely cleft to the middle, the broader segments oblong to oblong-obovate; stem and pedicels minutely pilose, sometimes also strigose; sepals in anthesis appressed-ascending, their margins when mature ciliate with tuberculate- or pustular-based hairs, their upper surfaces glabrous. PLATE 814.

The habitat of *Phacelia fallax* is rarely given on the labels before me. Such as indicate it say thin soil or mountain-slopes (in Georgia on granitic rock). Small, familiar with *P. fallax*, rather than *P. hirsuta*, says "Dry soil, rocks and open woods"; and McVaugh[1], who, like Brand, defines as the western *P. hirsuta* Nutt. the plant of Stone Mountain and vicinity with hairs of the sepals "often enlarged at base and terminating in raised pustules or teeth on the sepals," cites it for Georgia as a secondary member of the flora of the granite flat-rocks. Its habitat in Giles County, Virginia, is not recorded but since McVaugh's map (his fig. 1) of granitic outcrops of the eastern United States, showing them to extend northward across Virginia, indicates none of them in or very near Giles County, it is safe to say that there it was not found on granite. The localities in Georgia are, quite clearly, thin and subarid acid soil.

The locality for *Phacelia fallax* in Giles County, Virginia, cited by Gray, Syn. Fl. ii[1]. 164 (1878), by Brand, l. c. (1913) and the basis for the inclusion of Virginia in the range of the composite *P. hirsuta* in Gray's Manual and in Small's Manual, if taken into account by McVaugh, would have changed the tiny ellipse in northern Georgia (on his fig. 29) to an elongate tongue reaching western Virginia.

The habitats of true southwestern *P. hirsuta* (Arkansas, Oklahoma and Texas), on the other hand, are given as follows on the labels in the Gray Herbarium and in the Bebb Herbarium of the University of Oklahoma, the latter material kindly sent me for examination by Dr. Milton Hopkins, in addition to Nuttall's "sylvan prairies": wet prairie, Arkansas, *Bush*, no. 258; field,

[1] McVaugh, *The Vegetation of the Granite Flat-Rocks of the Southeastern United States*. Ecol. Monogr. xiii., especially p. 158 and fig. 29 (map) on p. 163 (1943).

Ark., *F. L. Harvey*, no. 12; limestone, hillside, Ark., *Damaree*, no. 14830; wet places, Oklahoma, *McClary*, May, 1935; meadow soil, Okla., *DeVitt and Clark*, no. 50; prairies, Okla., *Robert Bebb*, no. 3856 and *Demaree*, no. 12,646; on slough, Okla., *Richard F. Mason*, no. 127; shaded bank of slough, Okla., *R. F. Mason*, April 14, 1937; creek-banks and open woods, Okla., *Houghton* as *Stevens*, no. 2137; dense shrubbery along small stream, Okla., *E. L. Little, Jr.*, no. 128; wooded grassy glade in river-valley, Okla., *Hopkins*, no. 2943; wooded hills, Okla., *Goodman*, no. 2137; granite hills, Okla., *P. B. Sears*, no. 1317; dry sandstone ledges and boulders in oak-hickory forest, Okla., *Hopkins and Cross*, no. 1487; sandy soil, Okla., *V. Johnson*, no. 116; arid hillside, Okla., *M. Fielder*, April 20, 1927. The southwestern *P. hirsuta*, then, is evidently more calcicolous and less xerophytic than the southeastern *P. fallax*.

The Missouri dots for *Phacelia hirsuta* on McVaugh's map (his fig. 29) were presumably based on material of *P. gilioides* A. Brand (our PLATE 815, FIGS. 4–6). At least, all the Missouri specimens in the Gray Herbarium which were sent out as *P. hirsuta* are *P. gilioides*, a grayish or canescent plant with leaves cut into linear or linear-lanceolate segments, the stem and pedicels canescent-pilose without hirsute pubescence, the appressed calyx strigose, the corolla relatively small, its lobes undulate to dentate. It is P. GILIOIDES (misidentified as *P. hirsuta*) which Palmer & Steyermark assign in Missouri to "Rocky prairie, glades, ledges along bluffs, low rich woods, and alluvial ground along streams. Calciphile to circumneutral." The Oklahoma material in the Bebb Herbarium and the Gray Herbarium shows the following habitats: creek-bank, *Stevens*, no. 1377; prairies, *Robert Bebb*, nos. 3850 and 5090, *Ezra Brainerd*, April 12, 1908; prairies and wood-openings, *Robert Bebb*, no. 3884; woods, *Mrs. W. L. Ducker*, no. 39; shale, rocky mountain, April 6, 1941, *H. Randel Griffith;* rocky hills, *Robert Bebb*, no. 2720 and May, 1935, *J. E. McClary;* vacant lots and waste lands, *Auval H. Brown*, no. 18; cottonfield, April 19, 1927, *R. E. Jeffs*. Like *P. hirsuta*, it is also calcicolous and scarcely a xerophyte.

In *Phacelia dubia*[1] (PLATE 816) the sepals are unequal, the

[1] Although the combination *Phacelia dubia* (L.) Trel. is here credited to Trelease, it is done so under strong mental protest. The combination was published by Trelease in Branner & Coville, Ann. Rep. Geol. Surv. Arkansas for 1888. iv. 205 (1891)

outer ones usually broader and longer than the others. As the plant occurs through southeastern Virginia, the region best known to Clayton, thence northward into Pennsylvania, southward to southeastern North Carolina and west to the Blue Ridge and less frequently to Ohio, West Virginia and Tennessee its outer sepals are lanceolate to lance-oblong or -linear (FIGS. 1 and 2), sometimes slightly spatulate, the inner ones from lanceolate to linear. In mature fruit the lower and middle calices of each raceme are 4.5–7.5 mm. long and nearly to quite twice as long as the capsule; and the lower mature pedicels are 5–25 mm. long. About Nashville, Tennessee, and in Alleghany County, Virginia, there occurs an extreme (FIG. 4) of the species with the outer sepals ovate, the fruiting calyx only 4–5 mm. long, and the longer (lower) pedicels only 3–7 mm. long. Although small, it is not *P. dubia*, var. *georgiana* McVaugh, l. c. 158 (1943). That has narrow sepals and pinnate or deeply pinnatifid leaves, while the plant of Alleghany County and of the Nashville region has them shallowly lobed as in *P. dubia*, var. *dubia* McVaugh. I am calling the new plant

P. DUBIA (L.) Trel., var. **interior,** var. nov. (TAB. 816, FIG. 4), calycibus maturis 4–5 mm. longis; sepalis exterioribus ovatis; pedicellis imis maturis 3–7 mm. longis.—Western Virginia and north-central Tennessee. VIRGINIA: dry roadside, Covington, Alleghany County, May 12, 1916, *Hunnewell*, no. 4080. TEN-

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as follows: *Phacelia* "*dubia* (L.), (*P. parviflora*, Pursh); Harvey." That was all. Disregarding the somewhat unusual punctuation and the fact that *Phacelia dubia* is unknown from so far west as Arkansas, Harvey's material being *P. hirsuta* Nuttall from near its type-locality, we have the fact that Trelease did not take the trouble to cite the basonym of *P. dubia*, which was *Polemonium dubium* L. Sp. Pl. 163 (1753)—a photograph of the TYPE before me. The combination *Phacelia dubia* (L.) Small in Bull. Torr. Bot. Cl. xxi. 303 (1894) was properly made, with correct citation of the basonym. Personally I should choose to cite Small as the correct author of the combination but I am assured that in doing so I should be too "literal". The easy-going good nature by which many slipshod combinations by Britton, Stern and Poggenberg, by Small (elsewhere) and by some in recent years, have been accepted as "validated" by the next author who correctly made them with proper bibliographic citations cannot strongly appeal to those who look upon nomenclature as a necessary implement of careful taxonomic work. When a combination is carelessly made and used for a species to which the unstated but loosely assumed basonym does not belong the errors become doubled. I have more than once protested the practice of taking up such combinations as validly published. The difficulty, of course, is that thousands and thousands of regularly used combinations of the earlier botanists were thus published. When we can again have International Congresses it may be a safeguard against such opportunist and inconsiderate publication to establish a dead-line after which no such combinations will be valid. If I am here I will work for such legislation! Since the adoption of the more recently clarified rules of botanical nomenclature there is no excuse for slipshod bibliography.

NESSEE: gregarious in open shrubberies and pastures or in open grounds, Nashville, April, 1878, *Gattinger* (TYPE in Herb. Gray.); barrens near Nashville, April, *Gattinger* as *Curtiss*, no. 2131.

One of Gattinger's specimens was called *Phacelia pusilla* Buckley in Am. Journ. Sci. xlv. 172 (1843). Buckley's species has generally been considered identical with *P. dubia*, but it came from Alabama and had the "sepals linear-oblong, acute", which certainly is not the case with var. *interior*. I have not seen Buckley's type but his description of the Alabama plant, with the pinnatifid leaves with obovate and abruptly acuminate segments and with linear-oblong, acute sepals 2/3 the length of the corolla, might well have been drawn from *Harper*, no. 82, from Elmore County, which is one of the paratype-collections of *P. dubia*, var. *georgiana* McVaugh. Some specimens, like one from Nashville, April, 1884, *Miss Cushman*, and Biltmore, North Carolina, *Biltm. Herb.* no. 786[b], are transitional between var. *dubia* and var. *interior*.

In *Phacelia dubia* the seed (FIG. 3) is rugose-reticulate, in *P. fallax* (PLATE 814, FIG. 4) transversely lineate-rugose.

Although McVaugh delimits his tabulation of plants occurring on granite flat-rock at the North Carolina-Virginia boundary,[1] his maps of ranges often extend farther north. In view of the abundance of *Phacelia dubia* on the Coastal Plain of Virginia (in Henrico, Prince George, Sussex, Southampton and Greensville Counties, and presumably the type-locality of Clayton) and McVaugh's correct reference to it on his p. 158 as "abundant in many parts of Virginia", it is difficult to interpret his map of the range of *P. dubia* which shows only 3 or 4 stations in the state, these all on the granites of the northwestern section of the state. The inclusion of the many stations 100–135 miles to the southeast would make a somewhat different picture, as would the inclusion of Newbern at the mouth of the Neuse in Craven

[1] Near the fall-line in southeastern Virginia there are two stations of special interest in connection with McVaugh's study of the flora of the granite flat-rocks farther south. *Cheilanthes lanosa*, which "is approaching here the eastern edge of its range" on the flat-rocks of central Georgia (long. about 82° W.), comes down to flat-topped granite rock at the fall-line in western Sussex County, Virginia, long. about 77° 35′ W. —see RHODORA, xlii. 383 and 404 (1940). "The longleaf pine (*Pinus palustris* Mill.) apparently does not occur on any of the actual outcrops, but is common in Heard County, Georgia, in the vicinity of the flat-rocks", etc. At its northern limit it is primarily a species of Coastal Plain sands but nearly 50 miles to the westward it has a small outlying colony on a low granite hill at the outer edge of the Piedmont in Brunswick County,—see RHODORA, xlv. 374–376 (1943).

County, North Carolina (specimen from *M. A. Curtis*) and of Wilmington at the mouth of Cape Fear River in southeastern North Carolina (see Wilmington Flora by Thos. F. Wood and Gerald McCarthy in Journ. Elisha Mitch. Sci. Soc. for 1885–'86, p. 131, as *P. parviflora* Pursh). In fact, M. A. Curtis, who intimately knew North Carolina, did not restrict *P. dubia* (or *parviflora*) to the 2 stations on the granitic belt of western North Carolina. By him it was not known from the mountains but was thought to be characteristic of the "Low Distr.", *i. e.* the Coastal Plain (see M. A. Curtis, Geol. and Nat. Hist. Surv. N. C., Pt. III. Botany, 42 (1867)).

PLATE 814 is of PHACELIA FALLAX, all figs. from the TYPE: FIG. 1, portions of plant, × 1; FIG. 2, young inflorescence, × 3; FIG. 3, portion of mature calyx, × 10; FIG. 4, seed, × 10.

IN PLATE 815, FIGS. 1–3 are of PHACELIA HIRSUTA: FIG. 1, TYPE OR ISOTYPE, × 1; FIG. 2, portion of inflorescence, × 3, from northwestern Arkansas, *F. L. Harvey*, no. 12; FIG. 3, seed, × 10, from Prescott, Arkansas, *Bush*, no. 258. FIGS. 4–6, P. GILIOIDES: FIG. 4, plant, × 1, from Joplin, Missouri, *E. J. Palmer*, no. 1879 A (as *P. dubia*); FIG. 5, young inflorescence, × 3, from same no.; FIG. 6, seed, × 10, from near Muskogee, Oklahoma, *Robt. Bebb*, no. 3850.

IN PLATE 816, FIGS. 1–3 are of typical PHACELIA DUBIA: FIG. 1, young inflorescence, × 3, from below Emporia, Virginia, *Fernald & Lewis*, no. 14,541; FIG. 2, portion of mature inflorescence, × 3, from near Burgess Station, Virginia, *Fernald & Long*, no. 10,015; FIG. 3, seed, × 10, from no. 10,015. FIG. 4, var. INTERIOR, portion of mature inflorescence, × 3, from TYPE.

HYDROLEA UNIFLORA Raf. Aut. Bot. 34 (1840) must replace *H. affinis* Gray, Man. ed. 5: 370 (1867).

Rafinesque got hold of material without axillary spines, which is not unusual, both this glabrous species of the Interior and Southwest and the pubescent *H. quadrivalvis* Walt. having spines or not, the character variable. Likewise, the glabrous species may have solitary or glomerulate flowers. Rafinesque's description is unequivocal:

> 273, *Hydr. uniflora* Raf. caule flexuoso inerme glabro, fol. alt. lanceol. acutis subsessil. pedunc. axil. unifl. bract. 2 obl. ineq. cal. lin. glabris—Louisiana on Red River, sent me by Torrey as *Hydr. 4valvis*, but unlike the last, smooth, not spinose, leaves smaller, biuncial, flowers bluish white, anthers blue shaped like *x*, caps. bivalve

LYCOPUS AMPLECTENS Raf. Aut. Bot. 115 (1840). *L. europaeus*, var. *sessilifolius* Gray, Man. ed. 5: 345 (1867). *L. sessilifolius* Gray, Proc. Am. Acad. viii. 285 (1870).

There can be no doubt that Rafinesque had the plant known for three fourths of a century as *Lycopus sessilifolius*. His description is beyond dispute, for he restricted the genus to species with acerose teeth:

834, *Lyc. amplectens* Raf. glaber, caulib. virgatis simpl. angulis obt. fol. arcte sessil. subamplex. basi dilatatis oblongis acum. remote serratis, axilis nudis paucifl.—Alabama, pedal sesquipedal leaves uncial pale beneath, this sp. differs from all by obtuse angles and leaves not attenuate at base.

Photo. B. G. Schubert.

PANICUM BENNERI: FIGS. 1 and 2, × 1; FIG. 3, × 3; FIGS. 4 and 5, × 10; all from TYPE

Photo. B. G. Schubert.

YUCCA FILAMENTOSA: FIG. 1, flowers, × 1, from TYPE; FIG. 2, leaves, × ½; FIGS. 3 and 4, flowers, × 1; FIG. 5, ovary, style and filaments, × 5; fig. 6, capsules, × 1

Photo. B. G. Schubert.

YUCCA SMALLIANA: FIG. 1, leaves and flowers, × ½, from TYPE; FIG. 2, basal rosette, greatly reduced; FIGS. 3 and 4, flowers, × 1, from TYPE; FIG. 5, ovary, style and filaments, × 3; FIG. 6, capsule, × 1

Photo B. G. Schubert.

TRILLIUM CATESBAEI: FIG. 1, TYPE, × 1, after photograph by *C. A. and Una F. Weatherby*
TRILLIUM NERVOSUM: FIG. 2, TYPE-SHEET, × ½, after photograph by *C. A. and Una F. Weatherby*; FIG. 3, detail, to show style, × 3

Photo. B. G. Schubert.

TRILLIUM NERVOSUM: FIGS. 1 and 2, portions, × 1, of Catesby's plate of *Solanum triphyllon; flore hexapetalo carneo*

SMILAX BONA-NOX, var. EXAURICULATA: FIG. 3, leaf, × 1, from TYPE

Photo. H. G. Fernald.

SMILAX PSEUDO-CHINA: FIG. 1, SYNTYPE, after photograph sent by Dr. *John Ramsbottom;* FIG. 2, TYPE, after photograph sent from Linnean Society of London; both reduced; 1 leaf × 1

Photo. B. G. Schubert.

CYRILLA RACEMIFLORA: FIG. 3, fruit, × 5
Var. SUBGLOBOSA: FIG. 1, portion of fruiting branch, × 1; FIG. 2, fruit, × 5; both from TYPE

Photo. B. G. Schubert.

PHACELIA FALLAX, all figs. from TYPE: FIG. 1, portions of plant, × 1; FIG. 2, young inflorescence, × 3; FIG. 3, portion of mature calyx, × 10; FIG. 4, seed, × 10

Photo. B. G. Schubert.

Phacelia hirsuta: fig. 1, type or isotype, × 1; fig. 2, portion of inflorescence, × 3; fig. 3, seed, × 10

P. gilioides: fig. 4, plant, × 1; fig. 5, young inflorescence, × 3; fig. 6, seed, × 10

Photo. B. G. Schubert.

PHACELIA DUBIA: FIG. 1, young inflorescence, × 3; FIG. 2, portion of mature inflorescence, × 3; FIG. 3, seed, × 10

Var. INTERIOR: FIG. 4, portion of mature inflorescence, × 3, from TYPE

INDEX

New scientific names are printed in full-face type

Adlumia, 20; cirrhosa, 20
Aesculus floridana, 48; neglecta, 47; Pavia, 46, 48; sylvatica, 47
Alleghenian Convallaria, The Indigenous, 12
Ammannia auriculata, 50; coccinea, 50; diffusa, 50; Koehnei, 49, 50, var. exauriculata, 50; linearifolia, 50; longifolia, 50; multicaulis, 50; ramosa, 50; teres, 49, 50, var. **exauriculata, 50**
Andromeda formosissima, 50
Anona pygmaea, 50
Asimina pygmaea, 50

Benner, Walter Mackinnett (dedication of species to), 3
Black Oak, 44

Callicarpa, 46
Cheilanthes lanosa, 55
China radix, 32
Cladrastis, 20
Clintonia, 20; borealis, 20
Convallaria globosa, 13, 14; majalis, 12–14; majuscula, 13, 14; montana, 13, 14; parviflora, 13, 14; pseudomajalis, 13, 14; The Indigenous Alleghenian, 12
Cyrilla parviflora, 47; polystachya, 47; racemiflora, 46, 47, pl. 813, var. **subglobosa, 46,** 47, pl. **813**

Didiplis, 20
Diospyros, 44
Distinctions between Polygonatum biflorum and P. canaliculatum, Specific, 9

Four of Rafinesque's Species of Sisyrinchium, 42

Heracleum lanatum, 50, 51; maximum, 50
Hexalectris, 20; aphylla, 20
Hydrolea affinis, 56; quadrivalvis, 56; uniflora, 56

Identity of Yucca filamentosa, The, 5, pls. 808, 809
Ilysanthes, 20
Indigenous Alleghenian Convallaria, The, 12

Junci, 5
Juncoides carolinae, 5; pilosum, var. saltuense, 4
Juncus floridanus, 5; fuscatus, 5; Gerardi, 5; melanocarpus, 5; pilosus, 4; triglumis, 5
Jupica ? albiflora, 4

Liliaceae, 1, 2, 11
Lily-of-the-Valley, 12
Live Oak, 44
Luzula acuminata, 4, 5; var. **carolinae, 5;** carolinae, 4, 5; var. saltuensis, 4; labradorica, 5; parviflora, 5, var. melanocarpa, 5; pilosa, 4; saltuensis, 4
Lycopus amplectens, 56, 57; europaeus, var. sessilifolius, 56; sessilifolius, 56

Muscadina, 49
Muscadine, 48, 49

Nemexia, 36; Hugeri, 36
Nemexis elliptica, 35, 36
Nemopanthus, 20
Note on Smilax lanceolata, 39

Osmorhiza, 20

Padus caroliniana, 45
Panicum **Benneri, 2,** 3, pl. **807;** implicatum, 3; lanuginosum, 3, var. fasciculatum, 3, var. septentrionale, 3; meridionale, 3; subvillosum, 3; tennesseense, 3; villosissimum, 2, 3
Pastinaca sativa, 51
Peltandra, 20; alba, 20; undulata, 20
Phacelia dubia, 53–56, pl. 816; var. dubia, 54, 55; var. georgiana, 54, 55; var. **interior, 54**–56, pl. **816; fallax, 51**–53, 55, 56, pl. **814;** gilioides, 53, 56, pl. 815; hirsuta, 51–54, 56, pl. 815; Plants passing as, 51; parviflora, 54, 56; pusilla, 55
Pinus lutea, 44; palustris, 44, 55; taeda, 44
Plants passing as Phacelia hirsuta, 51, pls. 814–816
Polemonium dubium, 54
Polygonatum, 9, 14; biflorum, 9–12; and P. canaliculatum, Specific

Distinctions between, 9; biflorum, forma **ramosum, 12**; canaliculatum, 9–12; Specific Distinctions between Polygonatum biflorum and, 9; commutatum, 9; forma ramosum, 12; giganteum, 9; pubescens, 9, 10, 12
Prunus caroliniana, 45; nemoralis, 45

Quercus alba, 44; cinerea, 44, 45; falcata, 44; geminata, 44; incana, 44, 45; lanata, 45, lobata, 44; maritima 45; nigra, 44; rubra, 44; tinctoria, 44; virginiana, 44

Rafinesque's Species of Sisyrinchium, Four of, 42
Rotala ramosior, 50, var. interior, 50

Sanguisorba canadensis, 50
Scuppernong, 48, 49
Sebastiania **fruticosa, 45**; ligustrina, 45, 46
Silene regia, 45; scabra, 45
Silkgrass, 8
Sisyrinchium, 42; albidum, 43; arenicola, 43; **Bicknellianum, 43**; fibrosa, 43; flexuosum, 42, 43; floridanum, 42, 43; Four of Rafinesque's Species of, 42; Langloisii, 43; minus, 42, 43; Nashii, 43, niveum, 42, 43; tenuifolium, 42, 43
Smilax, 33, 34, 36, 40, aspera, 32, 33; Bona-nox, 32, 36–38, 41, β. 37, var. **exauriculata**, 16, **36**, 37, pl. **811**, var. hastata, 37, subsp. hederaefolia, 36, 37, var. **hederaefolia, 36**–38; Bryoniae nigrae foliis, 38; § Caule aculeato, tereti, 38, caule aculeato tereti, 38; caule spinoso tereti, 41; celastroides, 34; China, 32; cinnamonifolia, 42; elliptica, 36; glauca, 32, 37; hastata, 37, var. lanceolata, 37; hederaefolia, 36, 37; herbacea, 34–36; hispida, 39; Hugeri, 36; inermis, 35; laevis Lauri folio, 41; lanceolata, 32, 37, 39–42; Note on, 39; laurifolia, 40, 41; ovata, 41; pandurata, 39; pedunculata, 35; Pseudo-China, 32–35, 38, 40, pl. 812; pulverulenta, 35, rotundifolia, 32, 33; Smallii, 41, 42; tamnifolia, 32–35, 38, 39; tamnoides, 33, 34, 38, 39, var. **hispida, 39**; Walteri, 33, 40
Solanum triphyllon; flore, etc. 14, 16, pl. 811
Specific Distinctions between Polygonatum biflorum and P. canaliculatum, 9
Steironema, 20
Stewartia, 46; montana, 50
Stillingia fruticosa, 45, 46; ligustrina, 45, 46
Styrax, 46

Trillium, 9, 18–20; Balduinianum, 17; Catesbaei, 14–16, pl. 810; Catesbaei and T. nervosum Ell., 14, pls. 810, 811; cernuum, 14, 15, var. declinatum, f. Walpolei, 17; cuneatum, 18, 19; declinatum, 16, 17; erectum, 19, var. declinatum, 16; flexipes, 16, 17, 19, forma **Walpolei, 17**; Gleasonii, 16, 17, 19; Hugeri, 18–20; lanceolatum, 17–19; lancifolium, 17–19; maculatum, 18, 19; nervosum, 14–17, pl. 810; Trillium Catesbaei and, 14, pl. 810; recurvatum, 17, var. (?) lanceolatum, 17; rotundifolium, 19, var. flexicaule, 19, var. maculatum, 19, orbiculatum, 19, var. pallidum, 19, var. rubricaule, 19; undulatum, 19; Rugelii, 16; sessile, 15, 20; stylosum, 15, 16; subg. Anthopium, 17; subg. Sessilium, 17, 18; Underwoodii, 18–20

Vitis campestris, 48, 49; rotundifolia, 48, 49

White Oak, 44

Xyris albiflora, 4; Baldwiniana, 4; cylindrica, 4; fimbriata, 4; fistulosa, 4; flexuosa, 4; juncea, 4; pallescens, 4; retusa, 4; spiralis, 4; torta, 4; pallescens, 4

Yucca angustifolia, 8; concava, 5–8; filamentosa, 5–9, pl. 808; The Identity of, 5, pls. 808, 809; forma genuina, 5, 6, subforma angustifolia, 5, 6, 8, subforma latifolia, 5, 6, var. concava, 6, var. Y. concava, 6; flaccida, 9; flore albo, etc., 8; **Smalliana, 8**, 9, pl. **809**

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CLI

RHYNCHOSPORA, SECTION EURHYNCHOSPORA, IN CANADA, THE UNITED STATES AND THE WEST INDIES

SHIRLEY GALE

DATES OF ISSUE

Pages 89–134 and Plates 818–820 . . . . . 15 April, 1944
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Pages 255–278 and Plates 832–835 . . . . . 11 July, 1944

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RHYNCHOSPORA, SECTION EURHYNCHOSPORA, IN CANADA, THE UNITED STATES AND THE WEST INDIES

SHIRLEY GALE[1]

(Plates 818–835)

IN 1806 Vahl[2] segregated the genus *Rhynchospora* from *Schoenus* as the latter had been defined in the inclusive sense of Linnaeus. Vahl's brief diagnosis, with its emphasis upon the indurated, persistent style, was followed by descriptions of nineteen species. Of these original species nine are now recognized members of the Section *Eurhynchospora*. *R. inexpansa*, *R. fascicularis*, *R. distans* (*R. fascicularis* var. *distans* (Michx.) Chapm.), *R. capitellata*, *R. sparsa* (*R. miliacea* (Lam.) Gray) and *R. ciliata* (*R. ciliaris* (Michx.) Mohr) had been previously described under *Schoenus* by Michaux;[3] *R. glomerata* and *R. alba* under *Schoenus* by Linnaeus;[4] and *R. glauca* was only a new name given by Vahl to his own previously described *Schoenus rugosus*.[5] *R. fusca* (L.) Ait. f. was also included by Vahl as *R. alba* β *fusca*. Of these species *R. alba* has been selected to typify the genus.[6]

[1] Now Mrs. Chester E. Cross.
[2] Enum. ii. 229 (1806).
[3] Fl. Bor.-Am. i. 35–37 (1803).
[4] Sp. Pl. 44 (1753).
[5] Vahl, Eclog. Am. ii. 5 (1798).
[6] M. L. Green, Standard-Species Nom. Conserv. no. 492 (1926), mimeographed.

In 1816 Elliott published the first pages of his Sketch of the Botany of South Carolina and Georgia. Here he described three new species of *Rhynchospora*, *R. plumosa*, *R. punctata*, *R. caduca*, and, under *Scirpus*, a fourth, *R. schoenoides* (Ell.) Wood. He also made the new combination, *R. rariflora*, from Michaux's *Schoenus rariflorus*.

Unfortunately nothing but confusion has resulted from Muhlenberg's treatment of the genus. He attempted to reinstate *Schoenus* as inclusive of *Cladium* and *Rhynchospora*. Although several new species were listed in the first edition of his Catalogue[1] in 1813, they were not validated until the publication of his Descriptio Uberior Graminum[2] four years later. The names of his new species *S. ciliaris*, *S. capitatus*, *S. cymosus* and *S. setaceus* were later homonyms under *Schoenus*, nor are they available for use under *Rhynchospora*. Finally, he frequently neglected to give any indication of the authorship of his species.

Asa Gray's[3] early monograph of North American *Rhynchospora* is the first treatment of the genus to be done in the carefully documented, modern style; and it forms the basis for all later work on the genus as it is represented in Canada and the United States. Gray was able to verify, by means of fragments from the Michaux Herbarium, all of the Michaux species. He had the use of John Torrey's herbarium which contained among others, specimens collected by Elliott, Schweinitz, Ingalls and Curtis, as well as the herbarium of Baldwin. At the Philadelphia Academy of Natural Sciences he saw the Schweinitz herbarium and the Muhlenberg herbarium. Of the latter he remarks, "Specimens of many of these [Muhlenberg's species], however, do not exist in his herbarium; and those which have a place are in such a state of confusion, (there being often three or four species with a single label) that little information is to be obtained by consulting it." Gray wisely chose to base his treatment on the details of the achene; and, to aid in correct identification, a plate figuring the achene of each species was prepared. The descriptions are original, detailed, and accurate, and are accompanied by synonymy, the citation of specimens and careful dis-

[1] Ibid. 5 (1813).
[2] Ibid. 4 (1817).
[3] Ann. Lyc. N. Y. iii. 191–220 (1835).

cussions. The exigencies of the primary division into "nuts rugose" and "nuts not rugose" forced the separation of *R. plumosa* from the closely related *R. oligantha;* but, in good part, the related species were placed together. There was, however, no attempt to separate the thirty recognized species into formal groups.[1] *R. Torreyana, R. microcarpa* Baldw. ex Gray, *R. Elliottii* (renamed *R. Grayii* by Kunth), *R. megalocarpa, R. Baldwinii, R. oligantha, R. gracilenta,* and *R. cephalantha* were the additions to the Section *Eurhynchospora.* The correct combination *R. miliacea* was made from Lamarck's *Schoenus miliaceus,* and given preference over *R. sparsa* (Michx.) Vahl. However, to *Scirpus schoenoides* of Elliott, Gray gave a new name, *R. multiflora,* rather than the correct combination which was later made by Wood.[2] *R. patula* Gray was a *nomen confusum* since it was applied to sheets of *R. microcarpa* and *R. caduca. R. dodecandra* Baldw. ex Gray and *R. pycnocarpa* were synonyms of *R. megalocarpa,* as was *R. semiplumosa* of *R. plumosa* Ell. *R. paniculata* is true *R. glomerata* (L.) Vahl and the species to which the latter name was applied by Gray is *R. capitellata* (Michx.) Vahl.

A year later in Torrey's North American Cyperaceae[3] Gray reworked his treatment of *Rhynchospora,* segregating *R. oligantha, R. plumosa* and its synonym, *R. semiplumosa,* as 1, "*Eriochaete*" separated by the subglobose achene and plumose bristles; and 2, "*True Rhynchosporae*", including species with lenticular or compressed achenes. *R. macrostachya* and *R. corniculata* were transferred to the genus *Ceratoschoenus.* One new species, *R. filifolia* Gray, was described, and *R. pycnocarpa* was reduced to synonymy under *R. megalocarpa.*

In the year previous, Nees von Esenbeck[4] published his Synopsis Generum Cyperacearum. This was a much needed attempt to give the diagnostic characters of the *Cyperaceae,* and, in some cases, of the principal subgeneric divisions. He limited the genus *Rhynchospora* to species with "spiculae polygamae. Stylus bifidus. Perigynium setosum, setis rigidis denticulatis.

[1] With the exception of a suggestion that *R. corniculata* and *R. macrostachya* might be referred to *Cephaloschoenus* Nees.

[2] Class-Book of Bot. 744 (1861).

[3] Ann. Lyc. N. Y. iii. 362–372 (1836).

[4] Linnaea ix. 282 (1835).

Caryopsis styli basi persistente discretaque latirostrata." Although this definition is practically identical with that now applied to the Section *Eurhynchospora*, it was followed by a list of species many of which belonged to other sections.

Kunth's Enumeratio, Volume ii, appeared in 1837. The forty-four species of *Rhynchospora* were divided into the *Capitatae*, *Longirostres* and *Communes*. Of these only the *Communes* are considered in this paper; but it is important to notice that, as in *Rhynchospora* sensu Nees, the group *Communes* had the "Stylus bifidus" and was, in part, a precursor of the Subgenus *Diplostylis*. Kunth's treatment of the species consisted of a careful review rather than the addition of new species. His descriptions, like those of Gray, drew particular attention to the achenes. His special contribution is his elaborate synonymy, to which I am indebted for the clue to the identity of *Schoenus cymosus* Willd. In the Addenda and Corrigenda, he gave to *R. Elliottii* Gray its present name, *R. Grayii*, on account of the earlier *R. Elliottii* of Dietrich.

The treatment in Steudel's *Cyperaceae*,[1] despite its inclusion of several new species, was less original than that of Kunth. Steudel's main divisions were geographical. Under "I. Species Americae septentrionalis" he placed Gray's *Eriochaete* and *Rhynchosporae verae* (latinizing the latter). Under "II. Species Americae australis" he had a vague key, emphasizing, in the primary divisions, plumose as contrasted with scabrous bristles; and, in the secondary divisions, the type of inflorescence. Many of Steudel's descriptions were condensed latinizations of Gray's descriptions, both from the Monograph and from the North American Cyperaceae. He even included a full description of *R. pycnocarpa* Gray, although he explained in a note that it had been reduced by its author to a synonym of *R. megalocarpa*. Of Steudel's new species, *R. longiseta*, *R. microseta* and *R. foliata* are unknown to me. *R. longiseta* and *R. microseta* are referred by the Index Kewensis to the synonymy of *R. caduca* Elliott and *R. ciliata* Vahl (*R. ciliaris* (Michx.) Mohr) respectively. *R.* ? *monostachya* Steud. is *Eleocharis tuberculosa*[2] and *R. etuberculata* is referred again by the Index Kewensis to *Scirpus leptolepis*.

[1] Ibid. 139 (1855).

[2] See Svenson, Rhodora xxxix. 248 (1937).

Steudel also gave to *R. pallida* Curtis another name, *R. Curtisii*, thinking that *R. pallida* Nees, which had not previously been validly published, took precedence.

Grisebach[1] in 1857 set up the Section *Eurhynchospora* to contain species with "Setae elongatae. Stylus bifidus", and he typified it by *R. glauca* Vahl (*R. rugosa* (Vahl) Gale). This definition was later amplified in Part vi. of the Flora of the British West Indies[2] with the additional character "achaenium separated from the beak by a broad transverse joint." Of the species listed by him, I am excluding *R. cephalotes* Vahl from the section on the basis of its indurated scales and coarse, peculiar habit. *R. gracilis* Vahl is of uncertain identity, but Grisebach was probably using it in the sense of *R. globularis* (Chapm.) Small, var. *recognita* Gale and *R. rugosa* (formerly *R. glauca* Vahl).

Grisebach's chief contribution to the knowledge of this genus came with his work on the Wright collections from Cuba. *R. pruinosa* was described in Part II. of the Plantae Wrightianae[3], but the bulk of the new species were published in the Catalogus Plantarum Cubensium.[4] Here were added to the Series *Cernuae*, previously represented only by *R. pruinosa*, 4 additional species *R. Lindeniana*, *R. scabrata*, *R. tenuifolia* and *R. cernua*, although Grisebach mistakenly placed the last named species in a new section, *Microchaeta*. *R. odorata* Wright ex Griseb. was also included. *R. penniseta*, however, is *R. plumosa* Gray; *R. deflexa* is *R. cubensis* Rich., and *R. setacea* sensu Grisebach, non Vahl, is *R. rariflora* (Michx.) Ell. *R. cephalotoides*, also included by Grisebach in the Section *Eurhynchospora*, is closely related to *R. cephalotes*. I have excluded both of these species from this section. Known from the mainland, but new to Cuba, was *R. miliacea*.

The work begun by Grisebach was continued by Wright, working in collaboration with Francesco Sauvalle. The portion of the Flora Cubana[5] dealing with species of *Eurhynchospora* was published for the first time in 1871. Wright's new species *R.*

[1] Goetting. Abh. vii. 272 (p. 124 of repr.) (1857).
[2] Ibid. 573 (1864).
[3] Ibid. 535 (1862).
[4] Ibid. 242 (1866).
[5] Anal. Acad. Ci. Habana, viii. 83 (1871).

leptorhyncha and *R. brachychaeta* were carefully described; others, already treated by Grisebach or earlier authors, were merely listed with the number of the Wright collection. The authentic specimens are at the Gray Herbarium, as are also duplicates of Grisebach's species, but special care has been necessary in their citation, for the sheets are badly scrambled; the same number has often been applied to specimens belonging to 2 or more species and the accompanying memoranda as to locality and habitat often cannot be oriented with certainty to one of possibly three specimens on a sheet.

In 1873 Otto Boeckeler published, under the title Die Cyperaceen des Königlichen Herbarium zu Berlin, a treatment of the Tribe *Rhynchosporeae*. He described in all 136 species of *Rhynchospora*, several of which he derived from *Dichromena* as transfers. These were divided into two groups: A. *Capitatae*, B. *Corymbosae*. The *Eurhynchosporae* appeared with species of other sections under the latter heading. In this treatment most of the new species were Brazilian, but Boeckeler's descriptions of such North American species as *R. alba*, *R. caduca*, *R. plumosa*, etc. were original and among the best that have been written.

The designation *Dichostyleae* appeared in the summary of the genus by Bentham and Hooker.[1] It set off from the *Haplostyleae*, with apically bilobed styles, those species in which the styles were deeply cleft, forming slender stigmatic branches equal in length to the undivided portion of the style.

Prior to 1892 Gray's original treatment of species of the Coastal Plain had been augmented by scattered publications of other authors, notably Curtis, Carey, Boott, and more especially by Chapman's Flora of the Southern States. In that year, however, Britton[2] published a list of North American *Rhynchospora*. This list covered the Mexican species, but excluded those from the West Indies. It gave little information outside of the few characters employed in a rudimentary key to the groups of species. Its principal emphasis was placed on the synonymy, which was frequently incorrect, and statements as to the range of the species. Britton had been supplied by Clarke with an abstract of the latter's arrangement of the North American

[1] Gen. Pl. iii. 1060 (1883).
[2] Trans. N. Y. Acad. Sci. xi. 83–93–repr. 10–19 (1892).

species, and the *Eurhynchosporae*, as well as some species of other sections, were placed under the "Subgenus *Eurhynchospora* Clarke." *R. alba* var. *macra* Clarke, *R. glomerata* var. *discutiens* Clarke, and *R. fuscoides* Clarke were new; and were apparently taken from the abstract referred to in the introductory note. *R. fuscoides* was here without description but was validly published two years later in Clarke's treatment of the *Cyperaceae* for Urban. *R. glomerata* var. *minor* (*R. capitellata* (Michx.) Vahl) and *R. axillaris* var. *microcephala* (*R. microcephala* Britt. ex Small) were additions by Britton himself. *R. compressa* Chapm. was reduced to a variety under *R. cymosa* (*R. globularis* var. *recognita* Gale).

C. B. Clarke wrote the treatment of the *Cyperaceae* for Urban's Symbolae Antillanae, Volume II. With the fifty-five species of *Rhynchospora* appears the first key to species. Presumably it is, in part, a natural key, since series and sections are directly assigned to its main divisions. Its chief faults are those of brevity and too great a reliance on measurements. There is no mention of a subgenus, or even of a section *Eurhynchospora*.

Species of that section, as it is here interpreted, occur under the heading of Series B. *Diplostyleae*, and are classified as Section 2, *Plumosae*, Section 3, *Albae*, Section 4, *Fuscae*, and Section 5, *Glaucae*. Section *Plumosae* includes, in addition to *R. plumosa* Gray, the totally different *R. lunata* which has a curious horned tubercle. Section *Albae*, as defined, is synonymous with Series *Glomeratae* Small. It is represented only by *R. alba* from the mountains of Puerto Rico. Section *Fuscae* includes *R. fuscoides* (which is here supplied with a description), *R. leptorhyncha*, *R. fascicularis*, *R. distans* sensu Clarke (also *R. fascicularis*), *R. gracilenta* sensu Clarke (*R. leptorhyncha*), *R. Lindeniana*, and *R. pallida* sensu Clarke (*R. brachychaeta*). This section is defined as having setae antrorsely scabrous, nut smooth, not transversely wrinkled. Clarke must have overlooked the slightly rugulose surface in *R. Lindeniana*. *R. brachychaeta* (wrongly identified by Clarke as *R. pallida*) I have put with true *R. pallida* in the Series *Chapmaniae*. Section *Glaucae* is merely a name for a jumble of species having achenes with rugulose surfaces. Clarke placed a strong, and I think mistaken, emphasis on the importance of the original spelling of *Rhynchospora* as "*Rynchospora*."

As a result of this he took up the first specific name to appear in combination with the original "*Rynchospora.*" If a specific name had always appeared with the spelling, "*Rhynchospora,*" he made a new combination under the old spelling. This explains his recognition of *R. sparsa* Vahl in preference to the earlier combination *R. miliacea* (Lam.) Gray. It also explains why Vahl, Britton and Clarke are the only authorities cited after names of species long in good standing.

After the turn of the century, important treatments were included in the following: Small's Flora, 1903; the revision of Gray's Manual by Robinson & Fernald, 1908; and, later, Small's Manual, 1933. Britton also published *Rhynchospora* of Cuba,[1] another list which included new species and their descriptions.

Specific Criteria.—The species of *Rhynchospora* which come within the scope of this paper are perennials. The roots are of little aid in classification. They are usually fibrous and richly branched or occasionally thickened and spongy with only a few short branchlets. The bases are more often distinctive. In *R. pallida* they are usually cormous and covered with short, broad, imbricated scales—a condition occurring to a lesser degree in *R. megalocarpa.* In the Series *Cernuae* a short, densely fibrous caudex is developed, the fibres resulting from the fraying-out of the fibro-vascular strands in the lower portions of the old dried basal leaves. This character is one of several which are probably correlated with the intermittently exsiccated habitats of these species. The bases of *R. cubensis* and *R. stenophylloidea* are subligneous. A few species have stolons. Those of *R. fusca* are slender, whereas short, thick stolons bud out from the bases of *R. pallida.* *R. megalocarpa,* which populates the sand-hills of the southern Coastal Plain, also spreads by means of stolons. The commonest growth-habit, however, is a tuft; and several species, *R. inexpansa* among them, are reported as forming dense stools. An exception to the caespitose habit, as its name connotes, is *R. solitaria.*

The basal leaves are usually linear-elongate, from 1 to 7 mm. in width, or filiform. Commonly they are flat or somewhat canaliculate. The under surface is short-carinate, the keel be-

[1] Mem. Soc. Cubana Hist. Nat. ii. 185 (1916).

coming more prominent toward the apex so that the tip of the leaf is sharply triquetrous. This character is present, but less obvious, in a few species with broad, short leaves, such as *R. ciliaris* and *R. pruinosa*, in which the leaf is abruptly narrowed to an obtuse tip. Rarely the leaf-tips are rounded, as in *R. plumosa*. The angles of the tip, if not the entire margin of the leaf, are always more or less serrated. These microscopic teeth, apparently formed of pure silica, contribute in great part to the material worthlessness of the plants, for they render the leaves unfit for cattle-fodder. In *R. ciliaris* these serrations reach their maximum development as stiff, silvery cilia. Occasionally the leaves are involute, although this condition is difficult to determine from dried specimens. In *R. pruinosa* the leaves are not only canaliculate but also moderately revolute. However, the chief distinction of the leaves of this species lies in their peculiar upper surfaces. These are roughened and bear small white inclusions of lime which are responsible for the rimy or silvery appearance emphasized by the specific name. In another closely related species, *R. scabrata*, the upper surfaces of the leaves are definitely exasperate. The basal leaves vary from stiffly erect to flat and spreading to curling. The curling habit reaches its climax in the circinately coiled leaves of the tiny, depressed *R. crispa*. The CAULINE LEAVES are similar, in most cases, to those of the base. They decrease in size upward and are finally reduced to the setaceous or, less often, somewhat frondose bracts of the inflorescence. The typically closed sheaths are definitive of the *Cyperaceae* as a whole.

The CULMS are usually triquetrous and slender to robust, or filiform and subterete. The 2–several nodes each bear a leaf which may or may not subtend a lateral cluster of spikelets. The internodal surfaces are smooth or striate, and the culms range from stiffly erect to procumbent.

The INFLORESCENCE varies in size from a solitary terminal fascicle, as in *R. pallida*, to a terminal decompound fasciculate cyme which is accompanied by 4–8 smaller lateral cymes, as in *R. miliacea*. Throughout this paper I have applied the term "cyme" to the compound, flat-topped or concave clusters of spikelets which characterize in particular the Series *Caducae*. Compact bundles of mainly ascending spikelets are "fascicles",

whether they are numerous and approximate in the cyme or are solitary and distant in the axils of the cauline leaves. Fascicles may be globose, turbinate or corymbiform, depending upon their shape. Compact masses of spikelets oriented in all directions are heads, capituli or glomerules and may also be of primary or secondary degree. Unfortunately I have not been able to study flowering material of the genus, for from the dried specimens it is difficult to ascertain whether the so-called cymes are determinate, but to all appearances the main axis and the successive axes in turn are terminated by a spikelet.

The SPIKELETS are usually ovoid, but they may be subglobose, as in *R. globularis*, or fusiform as in *R. capillacea*. The lower 2 or 3 of the spirally imbricated scales are comparatively small and empty. The succeeding 1–10 subtend perfect florets, each of which may produce an achene. The terminal 1–2 scales subtend rudimentary florets or are empty. Occasionally the spikelet contains only a single floret.

The SCALES are papery (not indurated), tightly, but more often loosely, imbricate, and persistent or caducous. They are commonly brownish and fairly constant in shade, most commonly castaneous or fuscous. In *R. alba* and several members of the Series *Cernuae* they are whitish; in *R. pallida* they have a reddish tinge. Those of *R. leptorhyncha*, on the other hand, are blackened, as are frequently those of *R. cephalantha* var. *typica*. The general outline of the fertile scales is ovate, on the one hand, to narrowly lanceolate, and on the other to suborbicular. When tightly imbricate they are concave. The midrib frequently extends as a mucro which is often serrulate, and in *R. ciliaris* bears straggly reddish-brown cilia.

The STAMENS are variable in number, from 1–12, but are usually 3. In *R. odorata* the filaments are conspicuously marcescent.

The hypogynous BRISTLES are presumably the remnants of a perianth. They are borne at the base of the achene and are arranged in upper and lower series consisting of 3 bristles each. In *R. alba*, however, the bristles are from 10–12 and in *R. macra* from 18–20. The increase in number is probably due to chorisis; occasionally I have seen an achene of *R. alba* with 2-pronged, presumably imperfectly divided, bristles. The broad, straplike

bristles of the *Glomeratae* are unique, not only in their shape and size, but in their retrorse barbs. In other series the bristles are capillary, or flattened only at the base, and the barbs, or better the minute serrulations, are directed upwards. There are a few forms in the Series *Glomeratae* which, like the species of other series, have bristles with antrorse barbs or with barbs failing. This problem and its importance has been discussed under *R. capitellata* f. *discutiens*. The bristles in the Series *Plumosae* are, as indicated by the name of the series, characteristically plumose. Several species of other series, however, have a few silky hairs at the bases of the bristles. Occasionally the bristles fail to develop. This is true in particular of *R. Chapmanii* and *R. nuda*, and also of occasional achenes of *R. perplexa*.

The STYLE has two stigmatic branches which are characteristic of the genus and which indicate the bicarpellary nature of the gynoecium.

The ACHENE is the most important single character in the determination of a specimen, for, almost without exception, that of every species is distinct. It is derived from the development of one of the paired ovules of the gynoecium at the expense of the other. The shape is commonly ovate, lenticular and biconvex; usually the achene is marginate. Those of species belonging to the Series *Glomeratae* are frequently slenderly prolonged toward the base, forming a gynophore. Other peculiarities of the achenes of this series are the heavy wire-like margins and the prominent central umbo or boss. The umbonate condition also appears in achenes of other series, e. g. *R. Harperi* of the *Fuscae*. More often the central area of the achene is picked out by a smooth, pale disc. This is particularly true of *R. filifolia* the white disc of which has a sheen like that of glass. The achenes of *R. compressa* suggested the specific name, for they are so flattened that they have a shrunken appearance as if they had dried while immature. Some other species with strongly compressed achenes are *R. perplexa*, *R. schoenoides*, and *R. tenuifolia*. Very few of the series have achenes with an absolutely plain smooth surface. Usually the surface is alveolate or cancellate. The alveoli may, as in the case of the *Chapmaniae*, be reduced to tiny pricks; or they may be shallow, superficial and isodiametric as in the *Harveyae*. The most common modification of the alveoli is that

in which they are more or less aligned across the achene with the transverse walls pulled up into ridges. This produces the rugulose to ridged effect which is common in the Series *Rariflorae*, *Cernuae*, *Cubenses*, *Harveyae*, *Globulares*, *Caducae*, and *Glaucae*. Although the surface is ridged the individual alveoli may remain distinct, as in *R. caduca*, or they may be crowded so as to appear only as fine glistening striae between the ridges, or, in *R. tenuifolia*, over the faces of broad corrugations themselves. Like the scales, the achenes are brownish, but they vary in degree from the pale, lustreless shade of *R. nuda* to the dark, gleaming black-mahogany of *R. megalocarpa*. The measurements of the achenes are very dependable, and have been made with the aid of a finely divided steel rule, to tenths of a millimeter. The largest achenes in this section of the genus are those of *R. megalocarpa* (2.8–3.4 mm. wide, 3–4 mm. long). Among the smallest are those of *R. Knieskernii*, *R. sulcata*, and several species in the *Cernuae* the measurements of which do not exceed a millimeter in width and length.

Occasional trigonous achenes have been seen in the Series *Plumosae* and *Glomeratae*. Such anomalies are accompanied by tripartite styles. They probably represent the last traces of a tricarpellary condition.

The TUBERCLE, consisting of the indurated and persistent base of the style, is triangular and compressed. The achenes of the *Harveyae* which are, for the most part, tumid above, have conical tubercles. These are buttressed and slightly incrusted at the base by the narrowed summit of the achene. The tubercles in the Series *Chapmaniae* are extremely short, often apiculate. The tubercle of *R. compressa* is strongly depressed with a projecting basal flange. The margins of the tubercles in the Series *Fuscae* are thickly setose, and those of other series may be less so, or bare.

ACKNOWLEDGMENTS.—This study has been made under the guidance of Professor M. L. Fernald, and for his advice and patience I am most sincerely grateful. I also wish to express my appreciation to the many friends who have so freely given both time and encouragement—in particular to Mr. Charles A. Weatherby and Miss Bernice Schubert of the Gray Herbarium,

and to Dr. Chester E. Cross. I have been generously given the opportunity to study material from the herbaria of the following institutions to the curators of which I express my great obligation: Academy of Natural Sciences, Philadelphia (P); California Academy of Sciences (CA); Catholic University of America (CU); Duke University (D); Gray Herbarium (G); Atkins Institution of the Arnold Arboretum (A); Louisiana State University (La); Missouri Botanical Garden (Mo); New England Botanical Club (NE); New York Botanical Garden (NY); St. Bernard College (StB); United States National Arboretum (USNA); United States National Museum (US); University of North Carolina (NC); University of Pennsylvania (Penn).

RHYNCHOSPORA Vahl. Scales spirally imbricate; the lower 1 (rarely)–2 to several scales vacant, the following 1–10 subtending perfect florets, the upper 1–2 florets staminate or rudimentary: stamens 1–12, usually 1–3: hypogynous bristles 0–20, when present usually 6: style bilobed at the apex or with 2 long, slender, stigmatic branches: achene more or less compressed, crowned with a conspicuous tubercle consisting of the broad, persistent, indurated base, or even the greater part, of the style.—Chiefly perennials with more or less triangular culms and axillary inflorescences. Species of tropical and subtropical regions of both hemispheres, temperate North America and Eurasia. (Name taken from ῥύγχος, a *snout* and σπορά, a *seed*, from the beaked achene.)—Enum. ii. 229 (1806); Gray, Ann. Lyc. N. Y. iii. 194 (1835); Kunth, Enum. ii. 287 (1837); Steud. Cyp. 139 (1855); Bentham & Hooker, Gen. Pl. iii. 1058 (1883); Pax in Engler & Prantl, Pflzfam. ii. 2: 116 (1887); Clarke in Urban, Symb. Ant. ii. 103 (1900); Pfeiffer in Fedde, Rep. Spec. Nov. xxxviii. 89 (1935). *Triodon* L. C. Richard in Persoon, Synops. i. 60 (1805) in a note; nomen rejiciendum. *Phaeocephalum* Ehrh. Beitr. iv. 146 (1789), nomen illegitimum.

Since this paper is limited to a consideration of the Section *Eurhynchospora* the generic definition given above is neither original nor complete; nor has any attempt been made to include in the list of generic synonyms the numerous tropical genera of Nees, none of which come within the scope of this paper.

In 1935 the name *Rhynchospora*[1] was conserved over *Triodon* L. C. Richard, which threw into synonymy all previous combinations made by Farwell[2] under *Triodon*. House[3] in 1920 at-

[1] Int. Rules Bot. Nomencl. 90 (1935).
[2] Rep. Mich. Acad. Sci. xv. 167 (1913); xix. 253 (1917).
[3] Am. Midland Nat. vi. 201 (1920).

tempted to set up the generic name *Phaeocephalum* Ehrh., but the name is excluded by the International Rules, under Art. 67 (3), as a unitary designation of species, not intended as a generic name.

However, at present the status of the generic name is once again challenged, for Pfeiffer[1] has brought up the problem of the inclusion of *Pleurostachys* Brongn.[2] and *Dichromena* Michx.[3] within the genus. Whether Pfeiffer's solution, which reduces both genera to the status of synonyms under *Rhynchospora*, is sound, I do not know. It is a problem for the student of the *Rhynchosporeae* as a whole. However, the name *Dichromena* has priority over *Rhynchospora*, and the inclusion of the two under one generic name would necessitate either the transfer of the species of *Rhynchospora* to *Dichromena*, following the precedent of Macbride[4], or the conservation of the name *Rhynchospora* over *Dichromena* as proposed by Pfeiffer[5], with the necessary combinations under *Rhynchospora*, many of which have already been made by that author.

Subgenus Distylis Pax. Style deeply cleft; stigmatic branches linear, equal in length to the undivided portion of the style.—In Engler & Prantl, Pflzfam. ii. 2: 117 (1887). *Rhynchospora* 3. *Communes* Kunth, Enum. ii. 295 (1837). *Rhynchospora* ii. *Dichostyleae* Bentham & Hooker, Gen. Pl. iii. 1060 (1883). *Rhynchospora* Series B. *Diplostyleae* Clarke in Urban, Symb. Ant. ii. 104 (1900). Subgenus *Diplostylis* Pfeiffer in Fedde, Rep. Spec. Nov. xxxviii. 91 (1935).

Section Eurhynchospora Griseb. Scales thin and papery, not indurate, often loosely imbricate: bristles 0 (rarely)–20, usually 6 and equal to or exceeding half the achene in height, if bristles consistently failing achenes smooth (e. g. *R. Chapmanii*, *R. nuda*): achenes commonly ovate in outline, lenticular and gradually biconvex or umbonate, less often subglobose; surface smooth to strongly alveolate to striate and ridged: tubercle discrete, triangular or conical, compressed.—Goetting. Abh. vii. 272 (1857); Bentham & Hooker, Gen. Pl. iii. 1060 (1883); Pfeiffer in Fedde, Rep. Spec. Nov. xxxviii. 91 (1935). *Rhynchospora* Series B. *Diplostyleae*, Divisio 5. *Eu-Rhynchospora* Clarke in Kew Bull. Add. Ser. viii. 119 (1908). *Rhynchospora* ii. Subgenus *Eurhynchospora* Clarke ex Britton, Trans. N. Y. Acad. Sci. xi. 85 (1892).

[1] Fedde, Rep. Spec. Nov. xxxviii. 88 (1935); xliii. 258 (1938).
[2] Brongniart in Duperr. Voy. Coq. Bot. 172 t. 31 (1829).
[3] Fl. Bor.-Am. i. 37 (1803).
[4] Field Mus. Pub. Bot. iv. 166 (1929); viii. 113 (1930); xi. 5 (1931); xiii. 301 (1936).
[5] Fedde, Rep. Spec. Nov. xliii. 261 (1938).

KEY TO SERIES IN SECTION EURHYNCHOSPORA

a. Bristles retrorsely barbed, or if barbs antrorse or failing, bristles robust, straplike, pale, exceeding the achene. 1. Series *Glomeratae*.

a. Bristles antrorsely barbed or failing, rarely smooth, then capillary and fragile . . . . *b*.

b. Bristles well developed and heavily plumose for at least ½ their length or reduced to six basal tufts . . . . . 2. Series *Plumosae*.

b. Bristles upwardly serrulate with or without a few basal hairs, rarely smooth . . . . *c*.

c. Surface of achene smooth or pricked by small dark pits; achene chestnut-brown or dark brown (then lenticular and moderately biconvex), not tumid . . . . *d*.

d. Surface of achene pricked by tiny dark pits or, if surface smooth, bristles 1–3 and rudimentary or failing; lateral fascicles rare, with exception of 1–3 in *R. brachychaeta* . . . . . 3. Series *Chapmaniae*.

d. Surface of achene smooth; bristles 6 and well developed except in *R. fascicularis* var. *typica* and *R. debilis* where they are often 5 to 6 and rudimentary; lateral fascicles present in well developed specimens . . . . *e*.

e. Achenes small, usually less than 1 mm. wide, light brown, pyriform or narrowly ellipsoid with the maximum width near the apex . . . . . 4. Series *Fuscae*.

e. Achenes exceeding 1 mm. in width (with the exception of that of *R. Fernaldii* which is minute and blackish), broadly ovate in outline, their maximum width corresponding to their midpoint . . 5. Series *Fasciculares*.

c. Surface of achene transversely rugulose to ridged, or with alveoli forming a honeycomb-pattern, if rarely smoothish then brown and tumid to subglobose . . . . *f*.

f. Culm terminated by an ovoid glomerule or spiciform cyme, or cymes, if compound corymbiform, small, with relatively few often straw-colored spikelets; culms relatively short to depressed . . . . *g*.

g. Spikelets remote on capillary pedicels; cymes corymbiform, spreading; 2 species only, both of the Coastal Plain, *R. rariflora* also in the West Indies 6. Series *Rariflorae*.

g. Spikelets approximate, if rarely pedicellate then strongly ascending; species limited to the West Indies . . . . . 7. Series *Cernuae*.

f. Culm terminated by a compound, usually decompound, glomerulose, corymbiform, congested or loose cyme; culms relatively tall, rarely depressed . . . . *h*.

h. Spikelets with 1 floret, the solitary achene terminating its axis; achene longitudinally wrinkled as if shriveled; 2 species of the Greater Antilles 8. Series *Cubenses*.

h. Spikelets with 2–several florets, one of which may be a terminal rudiment; achene not longitudinally wrinkled; many species of the Coastal Plain and the West Indies . . . . *i*.

i. Achene surmounted by a grayish, conical-apiculate tubercle with a subterete base which is slightly buttressed and often slightly incrusted by the narrowed neck of the achene; surface of achene

deeply alveolate and ridged only in *R. culixa*, otherwise mahogany-brown, smoothish or with a honeycomb-pattern of shallow isodiametric alveoli . . . . . 9. Series *Harveyae.*

i. Achene usually surmounted by a deltoid, compressed tubercle which is often attenuate, if conical-discoid and projecting at the base not visibly buttressed . . . . *j.*

j. Achene broadly obovoid or slenderly ellipsoid-obovoid, dull, castaneous or catching the light in the prominent, deeply etched alveoli, usually ridged . . . . *k.*

k. Cymes stiff, erect or spreading; branchlets terminating in glomeruli which may be dense or limited to 3–4 globose spikelets 10. Series *Globulares.*

k. Cymes usually flexuous, corymbiform, densely fasciculate (except for the stiff, open netlike cymes of *R. miliacea*), occasionally glomerulose in reduced phases of *R. microcarpa* . . . . . 11. Series *Caducae.*

j. Achene pyriform, often slenderly so, yellowish-brown to light brown, usually glossy; the surface alveoli reduced to longitudinal striae which are intercepted by transverse corrugations or vague rugulosities . . . . . 12. Series *Glaucae.*

Series 1. Glomeratae Small, emend. Plants of acid bogs of temperate North America and Eurasia with several species limited to the Coastal Plain; *R. alba* also in the mountains of Puerto Rico and (?) northeastern Brazil. Habit caespitose: leaves filiform to flattish and up to 5 mm. wide: culms capillary to stout, usually stiffly erect: inflorescence of 1 terminal and 1 to more (often several) lateral fascicles or glomerules, rarely cymose-fasciculate: spikelets 1–2-fruited: scales acute to mucronate, tightly or loosely imbricate: achene pyriform or with a conspicuous gynophore, smooth to granular or faintly rugulose, usually with a pale central disc; bristles 6, retrorsely barbellate, or if with barbs antrorse or failing the bristles robust, straplike and pale.—*Rhynchospora*, V. *Glomeratae* Small, Man. 175 (1933), in part. *Rhynchospora*, Series B. *Diplostyleae* Sect. 3. *Albae* Clarke in Urban, Symb. Ant. ii. 105 (1900).

Key to Species in Series Glomeratae

a. Achenes with a conspicuous, pale, wirelike margin, smooth, castaneous and unlined, usually lustrous, umbonate, with a pale disc and basally prolonged . . . . *b.*

b. Spikelets 1-fruited, the solitary achene terminating the axis . . . . *c.*

c. Inflorescence of 2–6 dense, globose glomerules (rarely subhemispherical and looser on poorly developed specimens), the crowded spikelets ascending to reflexed . . . . *d.*

d. Achenes minute, 0.9–1.1 mm. wide, 1.4–1.6 mm. long
1. *R. microcephala.*
d. Achenes 1.1–1.6 mm. wide, 1.8–2.5 mm. long....2. *R. cephalantha.*
c. Inflorescence of 3–7 turbinate to loosely hemispherical fascicles, the loosely aggregated spikelets ascending to divergent.....3. *R. chalarocephala.*
b. Spikelets usually 2- or more-fruited, or if one-fruited the achene always succeeded by a rudimentary floret....*e.*
e. Achene prominently umbonate, with a pale disc, depressed sides and raised wire-like margins; inflorescence of usually several strict, fasciculate, rarely glomerulose, cymes.....4. *R. glomerata.*
e. Achene gradually rounded without a prominent umbo, surface a uniform brown, margins narrow; inflorescence of 2–6 compact, irregularly lobed fascicles, less often cymose-fasciculate.....5. *R. capitellata*
a. Achenes inconspicuously marginate, finely granular to slightly rugulose, dark brown toward the margins from which short, dark, broken lines run in between the roughenings toward a more or less definite pale, polished disc....*f.*
f. Bristles 10–20, usually sparingly plumose at base....*g.*
g. Bristles 10–12; achenes 0.9–1.2 mm. wide, 1.6–1.8 mm. long; spikelets several-fruited or, if 1-fruited, with terminal rudimentary floret; scales typically whitish 6. *R. alba.*
g. Bristles 18–20; achenes 1.3–1.4 mm. wide, 2–2.1 mm. long; spikelets 1-fruited, without a terminal rudimentary floret; scales rusty.....7. *R. macra.*
f. Bristles 6, serrulate, not plumose at base....*h.*
h. Achene pyriform, not basally prolonged; fascicles 3–4, borne along the entire length of the culm.....8. *R. Knieskernii.*
h. Achene oblong-elliptic, with a very slender gynophore; fascicles 1–2, limited to the upper portion of the culm
9. *R. capillacea.*

1. R. MICROCEPHALA Britt. ex Small. Caespitose: leaves 1–3 mm. wide, narrowly linear, closely ascending, erect, becoming minutely serrulate and triquetrous toward the tips: culms subterete, smooth, slender, erect to flexuously ascending, 3.3–8.4 dm. high: spikelets crowded into 1 terminal and 2–5 lateral, densely globose, or less frequently looser, subhemispherical heads 1.1–1.8 cm. wide, on included peduncles: spikelets slenderly lanceolate-attenuate, sessile, ascending to reflexed, typically forming a solid echinate ball, 1-fruited; the solitary fertile floret terminal with no trace of a sterile rudiment: scales ovate to lanceolate, acute, chestnut to dark brown, tightly inrolled especially at the apices: bristles 6, straplike, retrorsely barbellate; their apices convergent about the tubercle which they slightly exceed: achene 0.9–1.1 mm. wide, 1.4–1.6 mm. long; its body suborbicular, with a short but narrow and distinct gynophore; surface smooth, lustrous, brown, with a prominent light umbo and a raised wirelike margin: tubercle subulate-attenuate, 0.7–1.1 mm. high; its base not wholly covering the summit of the achene. PLATE 818, FIGS. 3A and 3B; MAP 4.—Fl. 195, 1327 (1903) and Man. 181 (1933); Fernald, RHODORA, XXXVII. 404, pl.

391, figs. 4 and 5 (1935); Fernald & Gale, Rhodora, xlii. 428, figs. 3 and 4 (1940). *R. axillaris* var. *microcephala* Britton, Trans. N. Y. Acad. Sci. xi. 89 (1892); Britton & Brown, Ill. Fl. i. 279 (1896); Britton, Man. 185 (1901); Robinson & Fernald in Gray, Man. ed. 7: 201 (1908). *R. axillaris* sensu Britton in Britton & Brown, Ill. Fl. ed. 2: i. 344 (1913), in part; Britton, Mem. Soc. Cubana Hist. Nat. ii. 195 (1916), not as to name-bringing syn. *Schoenus axillaris* Lamarck.—Wet peaty or sandy clearings, swamps and pond-margins of the Coastal Plain from New Jersey southward to the Florida Peninsula, thence west to Mississippi; also in western Cuba. New Jersey: east of Parkdale (2 miles), Atlantic Co., Aug. 17, 1905, *Van Pelt* (P); Monmouth Co., 1845, *Knieskern* (NY, type of *R. axillaris* var. *microcephala*). Delaware: Indian River, Millsboro, Sussex Co., Sept. 21, 1907, *Brown* (P). Washington, District of Columbia: Sept. 18, 1901, *Steele* (NY). Maryland: Salisbury, Wicomico Co., Sept. 28, 1863, *Commons* (G, P). Virginia: sphagnous magnolia swamp at head of Garnett Creek, about 1 mile northeast of St. Stephen's Church, King and Queen Co., *Fernald & Long*, no. 13275 (G); fresh to brackish swales along North Landing River, near Creed's, Princess Anne Co., *Fernald, Long & Fogg*, no. 4830 (G, P); wet peaty clearings in woods of *Pinus serotina*, south of Grassfield, Norfolk Co., *Fernald & Long*, no. 3785 (G, P); moist sandy and peaty pine barrens south of Lee's Mill, Isle of Wight Co., *Fernald & Long*, no. 12592 (G); wet depressions in sandy pine barrens near Cox Landing, Nansemond Co., *Smith & Hodgdon* in Pl. Exsic. Gray., no. 923 (G, NY, P); sandy border of wooded swamp about 3 miles northwest of Ivor, Southampton Co., *Fernald & Long*, no. 6091 (G, P); sphagnous bog about 1 mile northwest of Dahlia, Greensville Co., *Fernald & Long*, no. 8992 (G, P). North Carolina: pineland, 3 miles north of Winton, Hertford Co., *Godfrey*, no. 5206 (G); moist rich soil, recently cleared land, Williamston, Martin Co., *Randolph & Randolph*, no. 694 (G); wet grassy railroad-ditch, 1 mile east of Balley, Wilson Co., *Oosting*, no. 1670 (CU, D); savanna at Chocowinity, Beaufort Co., *Godfrey*, no. 5415 (G); wet sandy soil, roadside near Carteret Co. Line on road to Maysville, Jones Co., *Beaven*, no. 499 (D); moist open sandy soil, north side of White Lake, Bladen Co., *Blomquist*, no. 10859 (CU); low boggy soil between Coats and Erwin, Harnett Co., *Correll & Blomquist*, no. 2537 (CU, D, G); edge of pocosin, Southport Supply Road, Brunswick Co., *Oosting*, no. 33722a (D); Cumberland Co., *Blomquist*, no. 5647 (D); marsh at Springfield, Scotland Co., *Godfrey*, no. 5098 (G). South Carolina: near Kershaw, Lancaster Co., *House*, no. 2618 (NY); wet soil, Hartsville, Darlington Co., July 12, 1920, *Norton* (NC); sandy drainage-ditch, 2 miles west of Salters, Williamsburg Co.,

Godfrey & Tryon, no. 502 (D, G, NY); Sumter Co., *Holdaway*, no. 11 (D); boggy swale, 5 miles south of Columbia, Lexington Co., *Godfrey & Tryon*, no. 1263 (G). GEORGIA: Cypress Pond, Bethesda Church, Effingham Co., *Eyles*, no. 6398 (CU); Chase Prairie, Okefenokee Swamp, Charlton Co., *J. S. Harper*, no. 731 (G). FLORIDA: South Jacksonville, Duval Co., Aug. 11, 1909, *Lang* (P); low pineland bordering Lake Geneva, near Keystone Heights, Clay Co., Feb. 24, 1925, *O'Neill* (CU); margin of pond along west boundary of Welaka, Putnam Co., June 26, 1940, *Laessle* (CU); in a low pineland, 7 miles north of Ft. Christmas, east of Orlando, Orange Co., *O'Neill*, no. 7679 (CU; US, without number); wet ditch, Lake Jovita, Pasco Co., *O'Neill*, no. 2609 (NY); flatwoods, 1 mile from Tiger Lake, Polk Co., *McFarlin*, no. 3466 (CU); ditch, Hardee Co., July 29, 1940, *Schallert* (G); margins of ponds in pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 864b (G, in part). ALABAMA: in a wet place, Perdue, Coffee Co., *Blanton*, no. 83 (US). MISSISSIPPI: Petit Bois Island, Jackson Co., *Tracy*, no. 4884 (NY, US); Biloxi, Harrison Co., *Tracy*, no. 1361 (NY). CUBA: in a belt of a species of *Andropogon*, Laguna Tobero, Remates, *Ekman*, no. 11357 (NY); wet soil, Laguna los Indios and vicinity, Pinar del Rio, *Shafer*, no. 10810 (NY) and 10819 (US); in floating islands, at a laguna west of town, La Grifa, Pinar del Rio, *Ekman*, no. 11274 (US); deposited on the shore of the laguna, Laguna Santa Maria, Pinar del Rio, *Ekman*, no. 17240 (NY).

2. R. CEPHALANTHA Gray. Caespitose: leaves 1–4.5 mm. broad, flat or tending to become inrolled on drying, serrulate on upper margins, erect; radical leaves equalling about ⅓ the culm; cauline leaves short: culms slender to stout, erect, obtusely trigonous, 0.4–1.1 m. tall: inflorescence 1–5 dm. long; glomerules densely subglobose to loosely hemispherical, 1–2.2 cm. wide, terminal and solitary or accompanied by 1–4 smaller lateral glomerules on subincluded peduncles: bracts foliaceous and conspicuous: spikelets ovoid, 4–6 mm. long, compact, sessile; the fertile floret consistently terminal and solitary with no trace of a succeeding rudimentary floret: scales castaneous to blackish, slightly mucronate, so tightly involute at their apices as to give an echinate appearance to the glomerule: bristles 6, robust, strap-like, with the margins and upper surfaces retrorsely barbed, stramineous to light brown, equalling to slightly exceeding the tubercle around which they converge: achene 1.1–1.6 mm. broad, 1.8–2.4 mm. long; its body suborbicular, usually with definite shoulders, lenticular and prominently umbonate, with a very slender gynophore; the sides depressed and rimmed by a raised wire-like margin; surface smooth, lustrous, castaneous, paler over the umbo: tubercle compressed, subulate-attenuate, 1.4–2.4 mm. long.

Key to the Varieties of R. cephalantha

Achenes 1.4–1.6 mm. wide, 2–2.5 mm. long; habit usually stiffly erect; culms often robust.
  Glomerules subglobose to loosely hemispherical, 1–3 (rarely 4 with the lowermost poorly formed); culms slender to stoutish ..... 2a. var. *typica*.
  Glomerules densely subglobose, 4–7 in number, the lowest remote; culms stout ..... 2b. var. *pleiocephala*.
Achenes 1.1–1.2 mm. wide, 1.8 mm. long; habit weakly erect; culms slender, attenuated in appearance ..... 2c. var. *attenuata*.

2a. Var. typica Fernald & Gale. Leaves 1.5–2.5 (–3) mm. broad, tending to become inrolled on drying: culms slender, 0.4–1 m. in height: inflorescence 1–2.8 dm. long (rarely longer) comprising about ⅕ the culm; glomerules subglobose to loosely hemispherical, 1.3–2.2 cm. wide, terminal and solitary or accompanied in the upper axils by 1–2 (rarely 3) smaller glomerules, then only the terminal glomerule subcompound to several-lobed: achene 1.4–1.6 mm. broad, 2–2.4 mm. long. Plate 818, figs. 4A and 4B; Map 7.—Rhodora, xlii. 423 (1940). *R. cephalantha* Gray, Ann. Lyc. N. Y. iii. 218, pl. 6, fig. 30 (1835) and Man. 533 (1848), in part var. *pleiocephala*, as with later authors; Chapman, Fl. So. U. S. 528 (1860); Fernald, Rhodora, xxxvii. 403, pl. 391, figs. 2 and 3 (1935). *R. axillaris* Britton, Bull. Torr. Bot. Cl. xv. 104 (1888) and Trans. N. Y. Acad. Sci. xi. 89 (1892), in part var. *pleiocephala*, as with later authors, not as to name-bringing syn. *Schoenus axillaris* Lam.; Britton & Brown, Ill. Fl. i. 279, fig. 655 (1896); Britton, Man. 185 (1901); Small, Fl. 195 (1903) and Man. 181 (1933); Robinson & Fernald in Gray, Man. ed. 7: 201, fig. 327 (1908). *Phaeocephalum axillare* House, Am. Midland Nat. vi. 201 (1920).—Sphagnous bogs of southern New Jersey, southward on the Coastal Plain to Georgia, thence west to eastern Louisiana. New Jersey: bog southeast along P. R. R., Bamber, Ocean Co., Aug. 25, 1909, *Long* (P); east of Parkdale, Atlantic Co., Aug. 17, 1905, *Van Pelt* (P); *Gray* ?, no. 1 (NY, type; accompanied by notes in Gray's handwriting); natural bog along Mullica River about 1.5 miles southeast of Atsion, Burlington Co., *Fogg*, no. 5662 (G). Delaware: swamps along Queen Anne Railroad, near Ellendale, Sussex Co., Aug. 17, 1899, *Commons* (P). Maryland: open white gravel bog, Powder Mill Bogs, near Lewiston, Prince George Co., *Blake*, no. 10670 (CA). Virginia: argillaceous and siliceous boggy depression southeast of Petersburg, at head of Poo Run, Prince George Co., *Fernald & Long*, no. 6090 (G, P); depression in argillaceous woods west of Winfield's Mill, Dinwiddie Co., *Fernald & Long*, no. 13902 (G); sphagnous argillaceous boggy depression just north of Wakefield, Sussex Co., *Fernald & Long*, no. 7352 (G, P); sphagnous bog about 1 mile northwest of Dahlia, Greensville Co., *Fernald & Long*, no. 8993 (G, NY, P).

North Carolina: sphagnous bog at Method, Wake Co., *Godfrey*, no. 4985 (CA, D, G); drainage-ditch at Carolina Beach, New Hanover Co., *Godfrey*, no. 4719 (G, NC); roadside-ditch between Beaufort and Atlantic, Carteret Co., *Blomquist*, no. 11300 (D). Georgia: cypress-pond, Bethesda Church, Effingham Co., *Eyles*, no. 6397 (CU); edge of cypress-pond, near Smithville, Lee Co., *Eyles*, no. 1711 (CU). Louisiana: in low pine barrens, St. Tammany Parish, Sept. 14, 1892, *Langlois* (US).

Forma **antrorsa,** f. nov. Setis antrorse hispidulis.—Occasional in range of the typical form. New Jersey: Hammonton, Atlantic Co., Aug. 4, 1907, *Bartram* (P); Parkdale, Camden Co., Sept. 18, 1916, *Pennell*, no. 9032 (NY); Quaker Bridge, Burlington Co., Sept. 3, 1867, *Parker* (G, in part the typical form; US); same locality, Aug. 18, 1866, *Diffenbaugh* (P); border of cranberry bog along Little Hauken Creek, north of Jenkins, Burlington Co., July 28, 1937, *Long*, no. 50858 (P); Symmes' Place 3 miles west of Cedar (Warren) Grove, Burlington Co., *Stone*, no. 14517 (P). Delaware: Ellendale, Sussex Co., Aug., 1874, *Canby* (G, NY, US); same locality, July 9, 1908, *Van Pelt* (P); sandy swamps near Georgetown, Aug. 26, 1897, *Commons* (P). North Carolina: savanna 5 miles east of Jacksonville, Onslow Co., Aug. 6, 1938, *Godfrey*, no. 5808 (G, type). South Carolina: drainage ditch, 3 miles north of McClellanville, Charleston Co., July 19, 1939, *Godfrey & Tryon*, no. 677 (G); grass-sedge bog or savanna, 12 miles north of Georgetown, Georgetown Co., Aug. 2, 1939, *Godfrey & Tryon*, no. 752a (D, G, NY).

2b. Var. pleiocephala Fernald & Gale. Leaves 2.5–4.5 mm. broad, flat: culms stout, 0.6–1.1 m. high: inflorescence 1.4–5 dm. long, comprising ¼–½ the culm; glomerules 4–7, densely subglobose, 1.8–2 cm. wide, 1–3 borne in the terminal and preceding axil, remainder remote: spikelets fulvous to castaneous. Map 5.—Rhodora, xlii. 424 (1940). *R. cephalantha* of earlier authors in part.—Exsiccated pond-holes and swampy ground of the Coastal Plain from southeastern Virginia to eastern Louisiana. Virginia: abundant and dominating an exsiccated argillaceous pond-hole in woods, about 1 mile south of Mercy Seat Church, Surry Co., *Fernald & Long*, no. 8994 (G, type; NY and P, isotypes); dominant in flat sphagnous pinelands, Collier's Yard, 3–4 miles southwest of Petersburg, Dinwiddie Co., *Fernald & Long*, no. 10548 (G); pond-hole in pine and oak woods near Three Creek, north of Emporia, Greensville Co., *Fernald & Long*, no. 9283 (G, P). North Carolina: moist swampy ground, Manteo-Wancheese, Roanoke Island, Dare Co., *Blomquist*, no. 7500 (D); low pineland at Dunn, Harnett Co., *Godfrey*, no. 6122 (D, G); in burned pocosin 5 miles north of White Lake, Bladen Co., *Blomquist*, no. 10872 (D, G); ditches near Wilmington, New Hanover Co., *Biltmore Herb.* no. 279a (G, NC, US); moist place

in savanna, Southport, Brunswick Co., Aug. 13, 1930, *Blomquist* (D); pineland at Nakina, Columbus Co., *Godfrey*, no. 6347 (G). South Carolina: sandy drainage ditch, 2 miles west of Salters, Williamsburg Co., *Godfrey & Tryon*, no. 504 (D, G, NY, P); grass-sedge bog or savanna, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 1061 (G, NY, P); boggy ditch in pine barrens, 2 miles east of Meggetts, Charleston Co., *Wiegand & Manning*, no. 582 (G). Georgia: Waycross, Ware Co., Aug. 18, 1909, *Lang* (P); pine barrens, near Lem Griffin's Camp, Okefenokee, Clinch Co., *Eyles*, no. 133 (CU); cypress head, Valdosta, Lowndes Co., May 27, 1940, *Sargent* (Sargent Herb.); wet meadow, Leslie, Sumter Co., *Harper*, no. 413 (G, NY, US). Florida: swampy places in pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 5016 (G, US); cypress swamp, vicinity of Eustis, Lake Co., *Nash*, no. 845 (CU, G, NY, P, US); swamp, Okefenokee region, Brevard Co., *Fredholm*, no. 5821 (G); bogs and shady swamps, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 279b (G, NY). Alabama: Miflin Creek, vicinity of Elberta, Baldwin Co., Aug. 21, 1925, *Wolf* (StB); in a wet place, Perdue, Coffee Co., *Blanton*, no. 83 (CA); ditches and swampy thickets, Mobile, Mobile Co., June, 1878, *Mohr* (US). Mississippi: Ocean Springs, Jackson Co., *Tracy*, no. 96 (NY); Wisdom, Harrison Co., *Tracy*, no. 3418 (G, NC, NY, US); open pine woods, 2 miles west of Bay of St. Louis, Hancock Co., *Correll & Correll*, no. 9103 (D). Louisiana: pine flatwoods west of Covington, St. Tammany Parish, *Brown*, no. 6649 (La); open pineland north of Abita Springs, St. Tammany Parish, *Pennell*, no. 4137 (D, NY, P); low moist grassy soil of open prairie, 3 miles east of Robert, Tangipahoa Parish, *Correll & Correll*, no. 9217 (D).

Forma **controversa,** f. nov. Setis antrorse hispidulis.—Infrequent in the range of the typical form. South Carolina: drainage ditch, 3 miles north of McClellanville, Charleston Co., *Godfrey & Tryon*, no. 675 (G); grass-sedge bog or savanna, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 752 (G, type; NY, isotype); shallow peaty pond in pine barren, 9 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 759 (D, G).

Var. **attenuata,** var. nov. Foliis 1–3 mm. latis planis: culmis 6–8 dm. altis gracilibus attenuatis: inflorescentia 2.2–3 dm. alta, culmo duplo vel triplo breviore; glomerulis 3–5 laxe subglobosis vel subhemisphaericis, 1–1.8 cm. latis: spiculis 4–4.5 mm. longis castaneis: achaenio 1.1–1.2 mm. lato 1.8 mm. longo: tuberculo 1.4–1.8 mm. alto. Map 6.—Swamp-margins and moist pinelands of the Coastal Plain of the Carolinas (rare), Mississippi and Alabama. North Carolina: Wilsons Mills, Johnston Co., *Ashe* (NC). South Carolina: flats across from paper mill,

Hartsville, Darlington Co., July 5, 1909, *Coker* (NC). ALABAMA: in a wet place, Perdue, Coffee Co., Aug. 23, 1933, *Blanton*, no. 83 (G, TYPE; CU, US, ISOTYPES); about swamp, Elberta, Baldwin Co., Aug. 21, 1926, *Wolf* (StB); common in swamp, Spring Hill, Mobile Co., Aug. 6, 1897, *Bush*, no. 243 (NY, US); moist sandy pineland, Theodore, Mobile Co., Aug. 30, 1912, *Pennell*, no. 4423 (NY, P); Mobile, Mobile Co., July 20, 1897, *Baker*, no. 843 (NY). MISSISSIPPI: Ocean Springs, Jackson Co., Aug. 21, 1889, *Tracy*, no. 124 (NY); same locality, July 18, 1891, *Earle* (NY); same locality, Aug. 27, 1891, *Seymour*, no. 8 (CA, G, NC); Biloxi, Harrison Co., July 31, 1900, *Tracy*, no. 6993 (G); same locality, July 25, 1892, *Tracy*, no. 1361 (G, US).

An examination of *R. microcephala* Britt. ex Small and *R. cephalantha* var. *pleiocephala* from the coastal areas of the Carolinas, Mississippi and Alabama has brought to light the existence of certain specimens, the achenes of which are smaller than those of the already known varieties of *R. cephalantha*, but larger than those of *R. microcephala*. At first sight these specimens appear as intermediate between the two species mentioned and suggest, as preferable, a restoration of Britton's *R. cephalantha* var. *microcephala*. However, one would expect these southern plants, if truly intermediate, to present a series of achenes ranging in size from those of *R. microcephala* to those of *R. cephalantha*. Actually, however, the achenes of these specimens appear to be of a definite size larger than those of the former, smaller than those of the latter species. The glomerules of this southern variety are from 2–4, hemispherical and indistinguishable from the occasionally smaller, looser, hemispherical glomerules of *R. cephalantha*. I am, therefore, assigning it to *R. cephalantha* as var. *attenuata*, to be distinguished from var. *typica* and var. *pleiocephala* primarily by its smaller achene; secondarily by its attenuated appearance, consistently weak glomerules and restricted southern range.

3. R. CHALAROCEPHALA Fernald & Gale. Caespitose: leaves 1– (rarely) 2 mm. wide, flat, crowded, erect; upper margins often minutely serrulate; tips triquetrous: culms subterete, slender to rarely stout, 1.8–8.3 dm. high: fascicles 3–7, remote, the majority 2–5 lobed; the terminal fascicle turbinate to loosely subhemispherical, 0.9–1.8 cm. in diameter; lateral fascicles consistently turbinate, on included peduncles: spikelets lanceolate in outline, loosely aggregated, ascending to divergent; the fertile floret solitary, abruptly terminating the axis of the spikelet: scales

lanceolate, acute, tightly imbricate about the achene and tubercle: bristles 6, robust, strap-shaped, retrorsely barbellate, erect, equalling the tubercle to slightly exceeding it: achene obovoid, lenticular, 0.9–1 mm. wide, 1.4–1.7 mm. long, with more or less definite shoulders and a drawn-out excessively slender gynophore; surface smooth, shining, umbonate, with depressed sides and a raised wirelike margin: tubercle subulate-attenuate, compressed, 1–1.6 mm. long; its base much narrower than the apex of the achene. Plate 818, figs. 1A and 1B, Map 8.—Rhodora, xlii. 426, figs. 1 and 2 (1940).—Swamps, lake-borders and roadside ditches of the Coastal Plain from the New Jersey pine barrens to Florida. New Jersey: wet pine barrens, Sims Place, Burlington Co., *Drushel & Svenson*, no. 6860 (G); Parkdale, Camden Co., *S. Brown*, no. 56 (P); peaty and sphagnous pond-hole depression near Hardingville, Gloucester Co., *Long*, no. 47134 (P); moist pine barrens, Egg Harbor City, Atlantic Co., *Mackenzie*, no. 5558 (NY); Maurice River flats east of Vineland, Cumberland Co., Aug. 12, 1923, *Bassett & Long* (P); wet peaty pond-hole about 1 mile west of Bennett, Cape May Co., *Long*, no. 23488 (P). Delaware: moist soil, Lewes, Sussex Co., Aug. 15, 1895, *Commons* (P); burned swamp, standing water, near Maryland line, *Beaven*, no. 69 (D). Maryland: marsh in abandoned mill pond near Sharptown, Wicomico Co., *O'Neill*, no. 7430 (CU, NY). Virginia: sandy and peaty border of Cat Pond south of Benns Church, Isle of Wight Co., *Fernald & Long*, no. 7357 (G, type; P, isotype); deep peat and mud, southeastern shore of Lake Drummond, Great Dismal Swamp, west of Wallaceton. Norfolk Co., *Fernald & Long*, no. 13570 (G). North Carolina: pineland, Sampson Co., *Blomquist*, no. 5657 (D); 4 miles north of Beaufort, Carteret Co., July 18, 1939, *Engels* (NC); savanna, 8 miles southwest of Jacksonville, Onslow Co., *Godfrey*, no. 6469 (G, NC); Pender Co., *Hyams*, no. 4979 (NY); edge of pocosin, 15 miles north of White Lake, Bladen Co., *Blomquist*, no. 10874 (CU, D); dried-out road-making sand-pit, 4 miles east of Bolton, Columbus Co., *Wiegand & Manning*, no. 581 (G); Southport, Brunswick Co., Aug. 13, 1930, *Blomquist* (G, P as no. 5648). South Carolina: shrub-bog, 3 miles east of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 774 (G); sandy drainage ditch, west of Salters, Williamsburg Co., *Godfrey & Tryon*, no. 514 (G, NY); marshy border of lake, 8 miles southeast of Columbia, Lexington Co., *Godfrey & Tryon*, no. 1339 (G, NY). Florida: swamps, Sanford, Orange Co., Nov. 3, 1927, *Rapp* (NY); prairie, Pinky-Villa, Kissimmee, Osceola Co., Oct. 1, 1938, *Singletary* (D).

4. R. glomerata (L.) Vahl. Caespitose: leaves flat, 2.5–5 mm. wide, linear-attenuate, carinate toward the apex with finely serrulate margins: culms triquetrous, smooth, ascending, 0.6–1.1

m. high, the upper ⅓–½ bearing the inflorescence, flexuous to arching: inflorescence composed of 3–6 narrow, flexuous, fasciculate cymes or large loose glomerules: spikelets ovoid, 4.5–6.5 mm. long, subsessile, ascending to spreading, 2–3-fruited (or if 1-fruited the spikelet terminated by a sterile floret): scales acute to obtuse, loosely imbricated except when the spikelet is 1-fruited, originally apiculate but usually soon erose, castaneous to dark brown: bristles 6, straplike; the margins retrorsely and heavily echinate; the tips connivent about the apex of the tubercle: achene 1.4 mm. wide, 1.5–1.7 mm. long; its body suborbicular, with definite shoulders, basally prolonged; surface glossy with pronounced pale umbo and heavy wirelike margin: tubercle compressed-subulate, 1.3–1.8 mm. long.

4a. Var. **typica.** Inflorescence composed of 4–6 narrow cymes, the small dense ultimate fascicles of which are borne on 3–4 slender approximate, ascending to arching branchlets which exceed one another so as to produce a continuous, wandlike effect: achene 1.2–1.4 mm. wide, 1.5–1.7 mm. long; gynophore of the achene thick and short: tubercle subulate, compressed; its base usually nearly covering the summit of the achene. PLATE 819, FIGS. 1A and 1B; MAP 2.—*R. glomerata* Vahl, Enum. ii. 234 (1806); Blake, RHODORA xx. 25, fig. 1 (1918); Fernald, RHODORA xxxvii. 401 (1935); Small, Man. 180 (1933). *Schoenus glomeratus* Linnaeus, Sp. Pl. i. 44 (1753). *R. paniculata* Gray, Ann. Lyc. N. Y. iii. 211, pl. 6, fig. 21 (1835), non Presl (1828). *R. glomerata* β *robustior* Kunth, Enum. ii. 296 (1837). *R. glomerata* var. *paniculata* (Gray) Chapman, Fl. So. U. S. 528 (1860); Britton, Trans. N. Y. Acad. Sci. xi. 88 (1892); Britton, Man. 185 (1901); Small, Fl. 195 (1903). Robinson & Fernald in Gray, Man. ed. 7: 201 (1908). *R. cymosa* Elliott, Sk. Bot. S. Car. and Ga. i. 58 (1816), non *Schoenus cymosus* Muhl. Cat., nomen nudum. *Phaeocephalum glomeratum* House, Am. Midland Nat. vi. 202 (1920). *Triodon glomeratus* [-*a*] Farwell, Rep. Mich. Acad. Sci. xv. 167 (1913).—Wet peaty or sandy soil, New Jersey, Delaware and southeastern Virginia, southward along the Coastal Plain to northern Florida and west to eastern Texas; inland in the Appalachians of the Carolinas southward; scattered in Tennessee and northern Mississippi; fairly frequent along the drainage of the Arkansas, Red, and Sabine Rivers. The species is so definite that only representative specimens from western Louisiana and eastern Texas, where var. *typica* might be confused with the smaller var. *angusta*, are here cited. LOUISIANA: stream-bottom 6 miles south of Franklinton, Washington Parish, *Brown*, no. 6643 (La); open pineland, 1–2 miles north of Abita Springs, St. Tammany Parish, *Pennell*, no. 4133 (P); banks of Stoke Creek, 4 miles southeast of Harrisonburg, Catahoula Parish, *Brown*, no. 7383 (La); low wet soil along ditch, 1 mile south of Derry,

Natchitoches Parish, *Correll & Correll*, no. 9988 (D); Sodus, Sabine Parish, Sept. 1, 1883, *Letterman* (Mo); creek-bottom, 5 miles east of Ruston, Lincoln Parish, *Brown*, no. 6048 (La); margin of pond near Minden, Webster Parish, *Brown*, no. 5354 (La); meadow in pine hills near Mansfield, DeSoto Parish, *Brown*, no. 6093 (La); stream-bottom in long-leaf pine hills near Flatwoods, Rapides Parish, *Brown*, no. 6125 (La); in low prairies, Pointe aux Loups, Acadia Parish, Sept. 17, 1894, *Langlois* (CU); mixed pine-hardwoods west of Sulfur, Calcasieu Parish, *Brown, Nyland & Rogers*, no. 8593 (La). Texas: swamps east of Mineola, Wood Co., Aug. 13, 1902, *Reverchon* (Mo); 10 miles northeast of Gilmer, Upshur Co., *Cory*, no. 25659 (CU); swamps, Swan, Smith Co., Aug. 7, 1902, *Reverchon* (Mo); sandy bogs, Grapeland, Houston Co., *Palmer*, no. 14436 (Mo, US); ½ mile east of Keechi, Leon Co., *Cory*, no. 25256 (CU); near Huntsville, Walker Co., July, 1913, *Young* (Mo); Livingston, Polk Co., *Palmer*, no. 6781 (Mo); Orange, Orange Co., Aug. 8, 1880, *Letterman* (Mo); Houston, Harris Co., July 20, 1919, *Fisher*, no. 45 (US).

4b. Var. **angusta,** var. nov. Cymis 3–6, subglomeratis, remotis: achaenio 1–1.1 mm. lato, 1.5–1.6 mm. longo, subgloboso, basi angusto, attenuato: tuberculo anguste subulato, basi quam achaenii apice valde angustiore, 1.3–1.8 mm. longo.—Low prairie, Arkansas (one collection), western Louisiana, and eastern Texas. Arkansas: Grand Prairie, Pulaski Co., *Harvey*, no. 7 (G) and same locality, July, *Harvey in Redfield Herb.*, no. 15190 (Mo). Louisiana: ditch in Holloway Prairie, Holloway, Rapides Parish, June 24, 1936, *Brown*, no. 6442 (La); common, low prairie, vicinity of Lake Charles, Calcasieu Parish, Aug. 25, 1898, *Mackenzie*, no. 442 (Mo, NC, NY); Lake Charles, Calcasieu Parish, Aug. 7, 1897, *Tracy* (G, US); 1839, *ex herb. Torrey* (G). Texas: 21 miles north of Deweyville, Newton Co., Oct. 4, 1934, *Cory*, no. 10866 (G); 2.6 miles east of Camp Jackson, Hardin Co., Sept. 13, 1936, *Cory*, no. 19711 (CU, G); Cypress City, Harris Co., *Boll*, no. 886 (G); brook banks, Hempstead, Waller Co., June 10, 1872, *Hall*, no. 718 (G, type; Mo, US, isotypes).

R. glomerata var. *angusta* possesses in common with var. *typica* a several-flowered spikelet maturing 1–3 achenes and terminated by a rudimentary floret. Its habit, however, is generally more robust; the leaves are 3–5 mm. wide, and the ultimate fascicles are densely aggregated to glomerulose. It is, however, on a basis of the achene that the varietal distinction chiefly rests. That of *R. glomerata* var. *typica* is broadly ovoid with a short, thick gynophore. The achene of var. *angusta*, however, is, as the name implies, narrower, somewhat shorter,

with a slender accentuated gynophore as in *R. microcephala*. Both varieties have in common the heavy wirelike margin, the prominent pale umbo and straplike retrorsely echinate setae.

The geographic range of the new variety impinges upon that of var. *typica* in Arkansas and Louisiana, but continues westward into eastern Texas.

5. R. CAPITELLATA (Michx.) Vahl. Caespitose: leaves 1.5–3.5 mm. wide, flat, short, smooth, slightly carinate, becoming minutely serrulate on the upper margins: culms erect, slender, obtusely triangular, smooth, 1.9–9.2 dm. tall: the terminal cyme composed of 1–several ultimate, turbinate (rarely globose) fascicles on short included branchlets; lateral fascicles 1–5 on subincluded peduncles: spikelets ovoid, 3.4–5 mm. long, subsessile, 2–5-fruited (rarely 1-fruited and then terminated by a sterile floret): scales obtuse to acute, short-mucronulate, castaneous, swiftly caducous, often forced apart by the maturing achene: bristles 6, straplike, but weaker than those of *R. glomerata*, with retrorse barbules dwindling toward the base; tips convergent around the tubercle which they fail to equal or but slightly exceed: achene pyriform, 0.9–1.2 mm. wide, 1.3–1.8 mm. long, lenticular, plump, without a prominent umbo, edged by a narrow wirelike margin; the brown surface at maturity entirely or nearly uniform in coloring, smooth, lustrous: tubercle compressed-subulate, pale, 0.9–1.6 mm. long; its base widening nearly to cover the summit of the achene. PLATE 819, FIGS. 3A and 3B; MAP 1.—Enum. ii. 235 (1806); Blake, RHODORA, XX. 27 (1918); Small, Man. 180 (1933). *Schoenus capitellatus* Michaux, Fl. Bor.-Am. i. 36 (1803), in part. *R. capitellata* var. *minor* (Britt.) Blake, RHODORA, XX. 28, fig. 2 (1918). *R. capitellata* var. *leptocarpa* (Chapman) Blake, RHODORA, XX. 28, fig. 5 (1918). *R. glomerata* sensu Gray, Gram. et Cyp. i. no. 94 (1834) and Ann. Lyc. N. Y. iii. 217, pl. 6, fig. 29 (1835), and later authors up to 1918, non (L.) Vahl; Chapman, Fl. So. U. S.: 527 (1860); Britton, Man. 185 (1901); Robinson & Fernald in Gray, Man. ed. 7: 201, fig. 326 (1908); Victorin, Fl. Laurent. 689, fig. 248 (1935). *R. glomerata* var. *minor* Britton, Trans. N. Y. Acad. Sci. xi. 89 (1892); Britton, Man. 185 (1901); Fernald, RHODORA, XXXVII. 402 (1935). *R. glomerata* var. *leptocarpa* Chapman ex Britton, Trans. N. Y. Acad. Sci. xi. 88 (1892); Fernald, RHODORA, XXXVII. 401, 402 (1935). *R. leptocarpa* (Chapm.) Small, Man. 181, 1503 (1933). *Phaeocephalum glomeratum* var. *minus* Farwell, Rep. Mich. Acad. Sci. xxi. 361 (1920).—Common on lakeshores, river-banks and boggy places of southern Nova Scotia and New England (excepting northernmost Maine and Upper Vermont), thence southward on the Coastal Plain to North

Carolina; inland to the vicinity of the Great Lakes and along the Blue Ridge and Alleghanies from Maryland to Georgia; less common throughout western Tennessee and Missouri, with scattered stations in lower Georgia, northwestern Florida, Alabama, Mississippi, Arkansas, and eastern Texas; re-occurring in the coastal ranges of northern California and southern Oregon. The citation of specimens of this common, well-known species is limited to those from the extremities of its range. New Brunswick: ledges by Miramichi River, Northumberland Co., *Fernald & Weatherby*, no. 2408 (G); damp shores below Oakiok, York Co., *Brittain*, no. 11 (G). Maine: St. Francis, Aroostook Co., 1881, *Furbish* (NE). Carolina: 1794, Michaux Herb. (G, type-photo of *Schoenus capitellatus*). Georgia: low wet woods along small stream, near Thomasville, Thomas Co., *Correll*, no. 6484A (D); wet woods near Whigham, Decatur Co., *Harper*, no. 1185 (NY, US); in the canyon at Tallulah Falls, Rabun Co., alt. 1600 ft., Aug. 3, 1893, *Small* (NY); densely shaded sphagnum pockets in a swamp, Sylvester, Worth Co., *Svenson*, no. 6928 (G). Florida: Quincy, Gadsden Co. (G, no collector designated but handwriting that of John Carey); swamp near De Funiak Springs, Walton Co., *Curtiss*, no. 5926 (G, NC, NY). Alabama: moist sandy soil, DeSoto Falls, Jefferson Co., *Ruth*, no. 127 (NY). Ontario: marshy places, Moon River, Muskoka, July 1882, *Burgess* (G); au bord d'un petit lac, Timagami Park, *Victorin, Germain & Meilleur*, no. 45386 (G); Sandwich, *Macoun*, no. 25338 (G, NY, US). Kentucky: near Harlan Court House, Harlan Co., *Kearney*, no. 24 (G); wet flats of Red River, Logan Co., Aug. 1, (?), *Short* (P); wet flat on Ky. 98, Marshall Co., *Braun*, no. 4173 (G). Tennessee: gravelly oak woods, 6 miles east of Crossville, Cumberland Co., *Svenson*, no. 4171 (G, P); wet roadside depression, Jamestown, Fentress Co., *Svenson*, no. 4104 (G); bog, South Indian Creek, Unicoi Co., *Price*, no. 980 (D); low ponds at Thompson's, Williamson Co., *Ruth*, no. 713 (NC, NY); dry oak woods, Lawrenceburg, Lawrence Co., *Svenson*, no. 4298 (G); along road in swamp, about 1.5 miles southeast of Hollow Rock Junction, Carroll Co., *Svenson*, no. 425 (G, US); ditches, Henderson, Chester Co., *Bain*, no. 245 (G). Mississippi: Saratoga, Simpson Co., *Tracy*, no. 8616 (G, NY). Wisconsin: damp sandy shore of Crooked Lake, Siren, Burnett Co., *Fassett*, no. 7457 (G, f. *discutiens*); moist meadow, Marquette, Green Lake Co., *Hotchkiss & Martin*, no. 4407 (US); Arena, Iowa Co., July 27, 1922, *Davis* (G, f. *discutiens*). Arkansas: Benton Co., *Plank* (Mo; NY, no. 5); Fayetteville, 1879, *Harvey* (G). Louisiana: New Orleans, *Ingalls* (NY, designated as *R. glomerata* in Gray's handwriting and cited as such by Gray). Oklahoma: wet open ground, Antlers, Pushtamaha Co., *Palmer*, no. 9004 (CA, Mo, P). Texas: Swan, Smith Co., *Reverchon*, no.

2917 (Mo). CALIFORNIA: near Trinity Center, Trinity Co., *Howell*, no. 12845 (CA, G); Pitkin Marsh, 5 miles north of Sebastopol, Sonoma Co., *Howell*, no. 12677 (CA, in part f. *discutiens;* G, entirely f. *discutiens*). OREGON: sphagnum bog, Brookings, Curry Co., *Peck*, no. 8793 (NY).

In a recent paper Pfeiffer[1] appropriates the name *R. capitellata* (Michx.) Vahl for the common tropical and subtropical species of the Western Hemisphere which has heretofore been known as *R. glauca* Vahl. Since the name-bringing synonym, *Schoenus capitellatus* Michx., has been generally listed by American botanists, following the precedent of Torrey and Gray, in the synonymy of a widely spread and common species of the Series *Albae*, it is necessary to review the available information concerning the authentic material of *S. capitellatus* in the Michaux Herbarium.

According to notes made by M. Gadaceau of the Paris Herbarium and quoted by Blake[2] in 1918, the Michaux Herbarium contains two sheets with the label, *Schoenus capitellatus*. On one of these are mounted specimens of *R. Grayii* Kunth (*R. Elliottii* Gray non Dietr.) and of the species mentioned above as belonging to the Series *Albae*. The Gray Herbarium has a photograph of this sheet, and the two specimens of *R. Grayii*, designated as A and B, can be plainly seen, one on either side of the centrally placed subcapitate plant with inflorescence labeled C. The original label with the name, "*Schoenus capitellatus*" and the data "Hab. in Carolina" is affixed to the righthand side of the sheet and two slips of paper bearing Gray's annotations "*R. Elliottii* Gray" and "*R. glomerata*" (the name wrongly applied by Gray and later botanists up to 1918 to the species here recognized as *R. capitellata* (Michx.) Vahl) are mounted in the opposite corner. Of the second sheet M. Gadaceau writes, "L'autre offre quatre beaux echantillons du *R. glauca* Vahl." He then continues with remarks on the various Michaux specimens from the Richard Herbarium. To this herbarium belongs a sheet of *Schoenus capitellatus*, as labeled by Michaux, which has been referred by A. Richard to *R. glauca* Vahl.

Pfeiffer apparently has not seen either the paper by Blake or the decisive specimens in the Michaux Herbarium; for neither are

[1] Fedde, Rep. Spec. Nov. xlix. 75 (1940).
[2] RHODORA, xx. 26 (1918).

mentioned in his article. He does state, however, that authors prior to Boeckeler (especially Kunth) were cognizant of the relationship of *Schoenus capitellatus* to *R. glauca*. This statement, although incorrect in so far as it includes Torrey and Gray, both of whom identified *S. capitellatus* with plant C mentioned above, does indicate the probable source of Pfeiffer's synonymy. He is apparently only taking over the synonymy of *R. glauca* as given by the older European botanists and interpreting it in the light of the present International Rules of Nomenclature. Such an explanation also accounts for Pfeiffer's inclusion of the basonym, *Schoenus fascicularis* Michx., of another well-known American species, *R. fascicularis* (Michx.) Vahl, in the synonymy of *R. capitellata;* for it is so placed by Kunth[1]. Undoubtedly the treatment by the earlier European botanists of *R. glauca* as a synonym of *R. capitellata* was the result of the inclusion of the specimens which were later identified as *R. glauca* Vahl under the name of *Schoenus capitellatus* in the Michaux Herbarium. However, viewed in conjunction with the original description of *S. capitellatus* in Michaux's Flora Boreali-Americana[2], there can be within the mixture of *R. Grayii* Kunth, *R. glauca* Vahl (?) and plant C of the Series *Albae* only one possible correct application of the name *Schoenus capitellatus;* for Michaux states that the specimen under consideration has "Capitula breviter pedunculata, interdum geminata: semen compresso-obovatum" and "setulae retrorsum muricatulae." The habitat he gives as Carolina. Of the three species mentioned above *R. glauca* is eliminated at once by its range; for it is unknown in the United States. Nor does it have retrorsely barbed bristles. It is possible that the specimens of *R. Grayii* had a part in the more generalized portions of Michaux's descriptions, but that they could not have been of sole consideration is evidenced in the portions of the description quoted above. The peduncles of the axillary "capitula" of *R. Grayii* are exserted and attenuated, the achene is conspicuously swollen above, and, as in *R. glauca*, the bristles are upwardly hispidulous. Following the precedent established by Blake, I am, therefore, applying the name *R. capitellata* (Michx.) Vahl to the species

[1] Enum. ii. 297 (1837).
[2] Fl. Bor.-Am. i. 36 (1803).

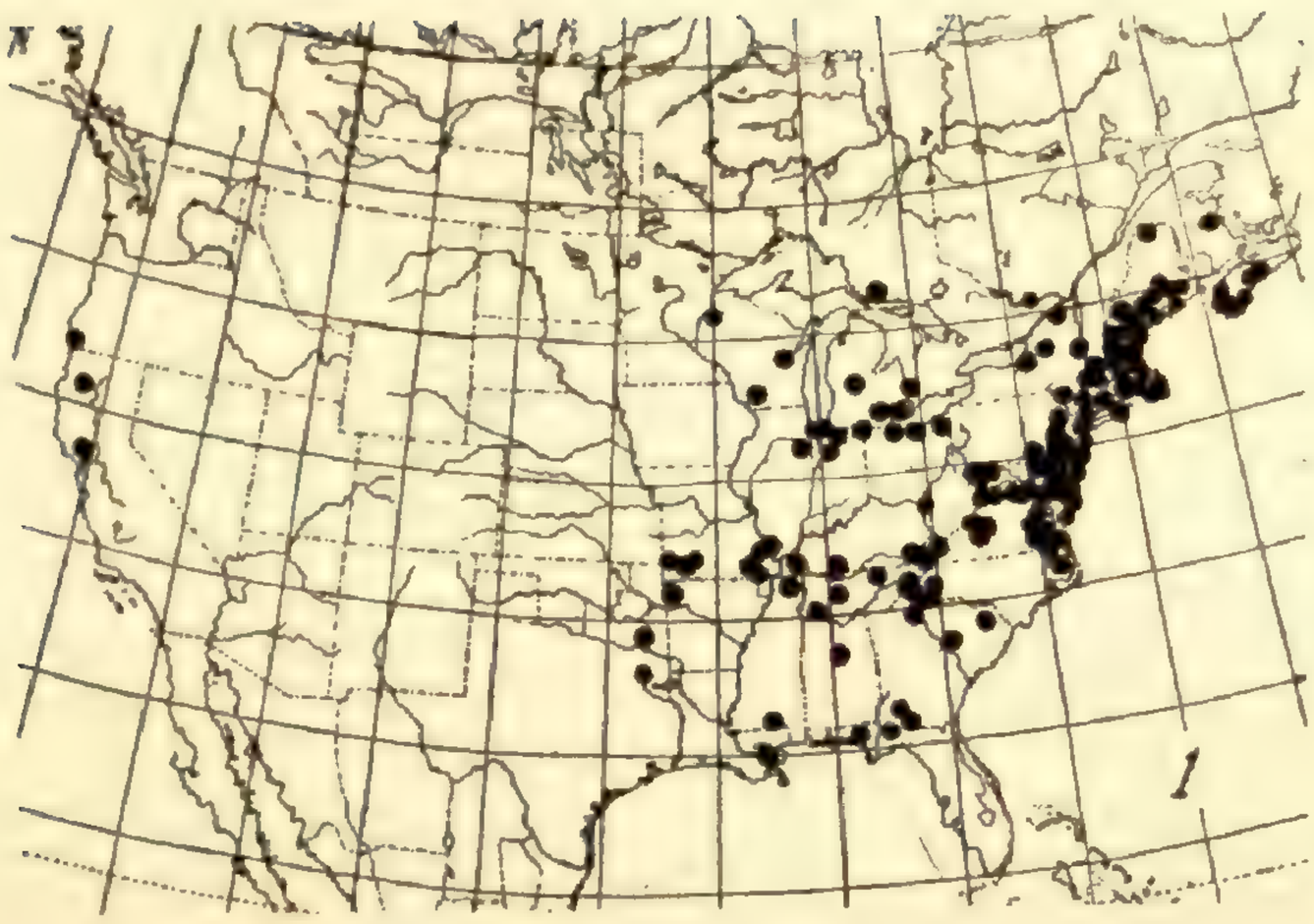
aforementioned as of the Series *Albae* which is typified by specimen C of the sheets labeled *Schoenus capitellatus* in the Michaux Herbarium.

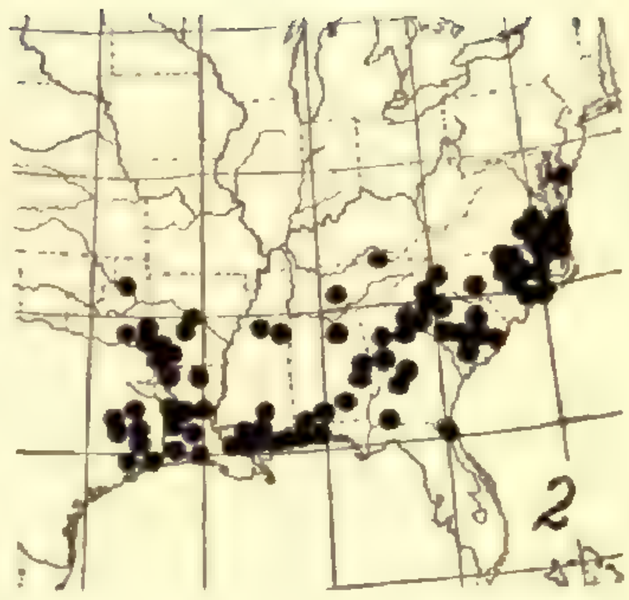
Forma **controversa** (Blake), comb. nov. Bristles antrorsely serrulate.—Var. *controversa* Blake, Rhodora, xx. 28, fig. 3 (1918). *R. glomerata* var. *minor* f. *controversa* (Blake) Fernald, Rhodora, xxxvii. 402 (1935). *R. Smallii* Britton ex Small, Fl. 1321, 1327 (1903) and Man. 182 (1933).—Occurs infrequently throughout the range of the typical *R. capitellata*, with the exception of the southern states.

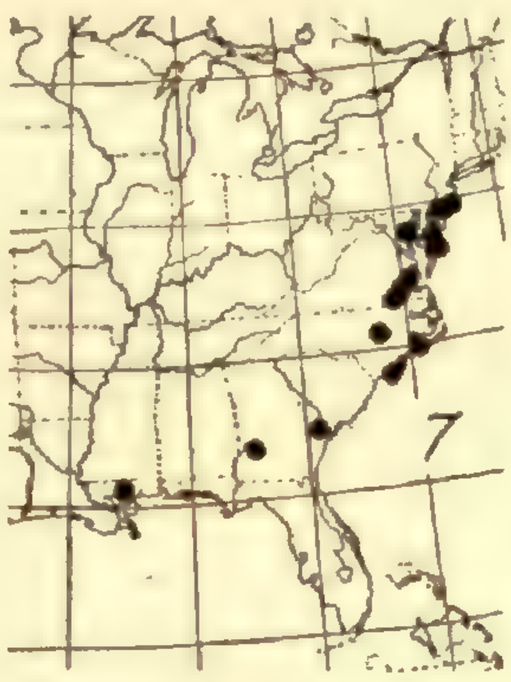
Forma **discutiens** (Clarke), comb. nov. Bristles smooth.—*R. glomerata* var. *discutiens* Clarke ex Britton, Trans. N. Y. Acad. Sci. xi. 89 (1892); Britton, Man. 185 (1901); Small, Fl. 195 (1903); Robinson & Fernald in Gray, Man. ed. 7: 201 (1908). *R. capitellata* var. *discutiens* (Clarke) Blake, Rhodora, xx. 28, fig. 4 (1918). *R. glomerata* var. *minor* f. *discutiens* (Clarke) Fernald, Rhodora, xxxvii. 402 (1935).—Occurs sporadically throughout the range of the typical *R. capitellata* with the exception of the southern states.

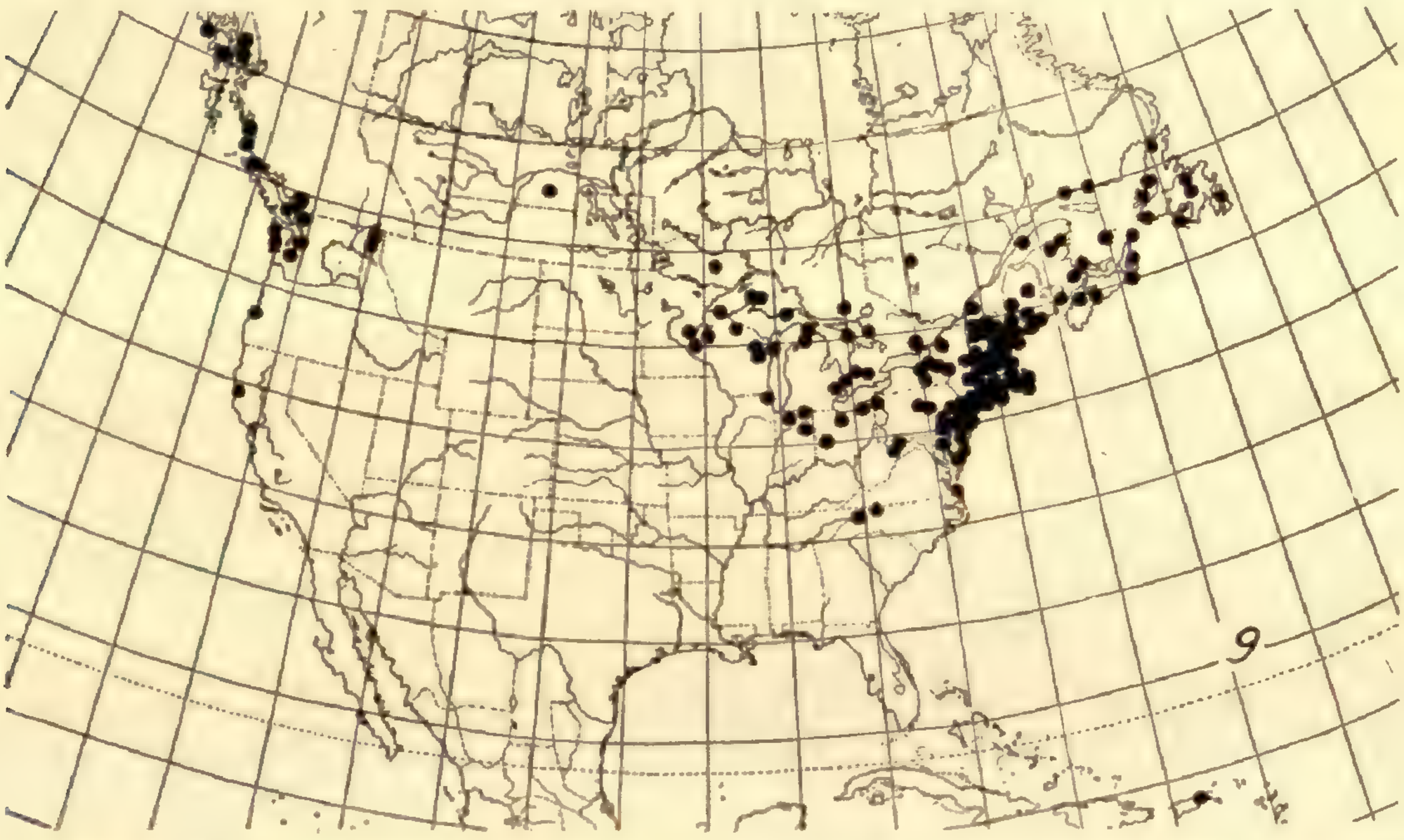
In 1933 Britton elevated the specimens of *R. capitellata* with antrorsely barbed bristles to specific rank under the name, *R. Smallii*. However, the antrorsely barbed phase of *R. cephalantha*, which has been generally known since the publication of Asa Gray's Monograph in 1835, has never received nomenclatorial recognition. Smooth-bristled specimens have been found in *R. capitellata* and *R. capillacea*, and have been generally treated as varieties. The first has its var. *discutiens*, made by Clarke in 1892 under *R. glomerata*, and transferred by Blake in 1918 to *R. capitellata*; the second, its var. *leviseta* E. J. Hill, 1876.

In 1935, with a view toward establishing uniformity in the treatment of these similar cases, Fernald discussed the significance of both the variation in direction, and the failure altogether, of barbing in the bristles. He points out that in *R. capillacea* the smooth-bristled state occurs sporadically throughout the wide range of that species. In *R. capitellata* (*glomerata* var. *minor*), as in *Eleocharis* and *Scirpus*, plants from the same locality have retrorsely or antrorsely barbed or even smooth bristles. Consequently he concludes that the atypical specimens are most adequately and satisfactorily covered as forms. I am accepting *R. capillacea*, f. *leviseta* (Hill) Fernald and following his precedent as to category in making the new combinations for









Range of 1, RHYNCHOSPORA CAPITELLATA; 2, R. GLOMERATA, var. TYPICA; 3, R. GLOMERATA, var. ANGUSTA; 4, R. MICROCEPHALA; 5, R. CEPHALANTHA, var. PLEIOCEPHALA; 6, R. CEPHALANTHA, var. ATTENUATA; 7, R. CEPHALANTHA, var. TYPICA; 8, R. CHALAROCEPHALA; 9, R. ALBA

both f. *discutiens* and f. *controversa* under *R. capitellata*. *R. cephalantha* var. *typica* f. *antrorsa* and var. *pleiocephala* f. *controversa* bring into line the hitherto neglected phases of that species.

6. R. ALBA (L.) Vahl. Caespitose, often densely so: leaves slenderly linear, 0.5–2.5 mm. wide, flat, becoming slightly carinate and then obscurely setaceous on keel and margins: culms slender, erect, triquetrous, 0.7–7 dm. high: fascicles 1–3, turbinate, 0.7–1.6 cm. wide; the smaller lateral fascicles exserted on slender, erect peduncles: spikelets ovoid, 3.5–5 mm. long, 2– (rarely) 3-flowered, often maturing 2 achenes, but if 1-fruited the spikelet terminated by an immature floret: fertile scales characteristically whitish to pale rufous, mucronate: bristles 10–12, stiffly connivent, obviously arranged in 2 series on the elongated stipe, retrorsely barbed, sparingly villous at the base, falling short of to exceeding the tubercle: achene pyriform, lenticular, biconvex, obscurely margined, with a prominent pale disc, irregularly lined, then generally darker toward the margins and faintly rugulose, 0.9–1.2 mm. wide, 1.6–1.8 (rarely–2) mm. long: tubercle attenuate-subulate, compressed, 0.6–1.2 mm. long; the narrow base not equalling the breadth of the summit of the achene. PLATE 819, FIGS. 4A and 4B; MAP 9.—Enum. ii. 236 (1806); Elliott, Sk. Bot. S. Car. and Ga. i. 57 (1816); Gray, Gram. et Cyp. i. no. 92 (1834) and Ann. Lyc. N. Y. iii. 213, pl. 6, fig. 24 (1835); Boeckeler, Linnaea, xxxvii. 570 (1873); Britton & Brown, Ill. Fl. i. 277, fig. 651 (1896), in part *R. macra* (Clarke) Small; Clarke in Urban, Symb. Ant. ii. 124 (1900); Britton, Man. 185 (1901), *R. macra* (Britt.) Small as to specimens from Florida; Robinson & Fernald in Gray, Man. ed. 7: 200, fig. 323 (1908); Small, Fl. 194 (1903) and Man. 180 (1933); M. L. Green, List of Standard Species of Nom. Conserv. 9, no. 492 (1926), mimeographed; Victorin, Fl. Laurent. 689, fig. 248 (1935); Fernald, RHODORA, xliv. 371 (1942). *Schoenus albus* Linnaeus, Sp. Pl. i. 44 (1753); Fl. Danica ii. 5, pl. 320 (1766); Michaux, Fl. Bor.-Am. i. 34 (1803). *R. alba* var. *macra* sensu Robinson & Fernald in Gray, Man. ed. 7: 201 (1908), non Clarke. *R. luquillensis* Britton, Bull. Torr. Bot. Cl. l. 56 (1923); Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 103 (1923). *Triodon albus* Farwell, Rep. Mich. Acad. Sci. xix. 253 (1917). *Phaeocephalum album* House, Am. Midland Nat. vi. 201 (1920). *Dichromena alba* Macbride, Field Mus. Pub. Bot. iv. 166 (1929).—Common in open sphagnum bogs from Newfoundland to Maryland, rare in Virginia, southward only in scattered mountain bogs of West Virginia, North Carolina and Puerto Rico; inland to the area of the Great Lakes and Saskatchewan (one collection), reappearing to the west in northern Idaho and along the Pacific coast from

northern California to southern Alaska; also in northern Eurasia. The citation of specimens of this well known and clearly defined species is limited to those from the outlying portions of its range. Quebec: openings in marly Arbor Vitae swamp, mouth of Bonaventure River, Bonaventure Co., *Collins, Fernald & Pease*, no. 5819 (G); open peaty spots in larch swamp, Grindstone, Grindstone Island, *Fernald, Long, & St. John*, no. 7015 (G, P); dans les tourbières, Isle à la Proie, Archipel de Mingan, *Victorin*, no. 20225 (G); Father Point, *Williamson*, no. 1090 (P); in peat bogs, St. Hubert, Chambly Co., July, 1910, *Victorin* (US); tourbière flottante, 93 miles au nord de Mont-Laurier, route Mont-Laurier, Senneterre, *Marie-Victorin, Rolland-Germain & Blain*, no. 309 (G). Delaware: New Castle, New Castle Co., *Tatnall* (G); swamps near Laurel, Sussex Co., Aug. 19, 1880, *Commons* (P). Maryland: 4 miles north of Salisbury, Wicomico Co., *Shreve & Jones*, no. 1278 (US); peat bog, Glenburnie, Anne Arundel Co., Aug. 19, 1905, *Chrysler* (G); Suitland Bog, Prince George Co., *C. P. Smith*, no. 3192 (CA); open white gravel bog, Powder Mill Bogs, near Lewiston, Prince George Co., *Blake*, no. 10671 (G); sphagnous bog, northwest of Mountain Lake Park and vicinity, Garrett Co., on the Alleghany Plateau, alt. 720 m., *Steele*, no. 77 (US). Virginia: wooded swamp of North Landing River, west of Pungo Ferry, Princess Anne Co., *Fernald & Long*, no. 13899 (G). West Virginia: Aurora and vicinity, Preston Co., alt. about 3000 ft., Aug. 15–Sept., *Steele & Steele* (NY, US). North Carolina: roadside between Sparta and Roaring Gap, Alleghany Co., *Blomquist*, no. 5612 (D). Saskatchewan: bog, Dahlton, Aug. 9, 1936, *Breitung* (NY). Idaho: Priest Lake, Bonner Co., *Piper*, no. 3756 (G, US); Minard's Bay, Bonner Co., Priest Lake, alt. 660 m., *MacDougal*, no. 294 (NY). California: Inglenook Swamp, Mendocino Co., *Congdon*, no. 67092 (G, US). Oregon: *Hall*, no. 568 (G); bog near Florence, Roosevelt Highway, Lane Co., *Henderson*, no. 13978 (P). Washington: in quaking sphagnum bog, Fazon Lake, Whatcom Co., *Muenscher*, no. 10145 (G); in floating bogs in Samish Lake, Whatcom Co., *Suksdorf*, no. 1014 (G, NY, US); bogs, rare, Seattle, King Co., *Piper*, no. 1121 (G, NY); in sphagnum bog, 28 miles south of Tacoma on Mt. Rainier Road, Pierce Co., *Abrams*, no. 9232 (NY); Wreck Creek Prairie near Granville, Chehalis Co., *Howell*, no. 374 (NY, P, US); bog, edge of ditch, Onslow Station, N. P. RR., 20 miles northwest of Hoquiam, Grays Harbor Co., *Foster*, no. 870 (US); bogs, Moclips, Grays Harbor Co., *Cowles*, no. 619 (G, Mo); in damp meadows of Baker Prairies, Grays Harbor Co., *McGee*, no. 556 (CA). British Columbia: Fort Rupert, Vancouver Island, 1904, *Hunt* (NY); Vancouver, Aug. 28, 1893, *Macoun* (US); meadows, boggy and rocky, of northwest part of Calvert Island, south of Kwatshua, *McCabe*, no. 3083

(G); muskegs in sphagnum in wet places, borders of ponds, Smyth Island, Bardswell Group, *McCabe*, no. 3184 (G). ALASKA: sphagnum bog, Wrangell, *Walker & Walker*, no. 728 (G); Sanitarium, *Anderson*, no. 290 (US, immature); bog, Ketchikan, *Cowles*, no. 1408 (US); vicinity of Loring, summer, 1903, *Chamberlain* (US, immature); in marshes near Yes Bay, *Howell*, no. 1683 (NY, US, immature); upland meadows, Back Bay, *Gorman*, no. 122 (NY, US, immature); marshy margin of lake, Prince of Wales Island, *Walker & Walker*, no. 904 (CU, G, NY, US). PUERTO RICO: rocks, summit of El Yunque, alt. 1050 m., *Gleason & Cook*, no. X-86 (NY) and *Britton & Bruner*, no. 7626 (NY); Sierra Luquillo, *Hioram*, no. 364 (NY, TYPE of *R. luquillensis;* US, ISOTYPE).

Britton's *R. luquillensis* from the eastern mountains of Puerto Rico is morphologically inseparable from phases of *R. alba*. In general appearance it closely resembles the short, thickly caespitose specimens of *R. alba* collected on the Newfoundland tablelands. *Gleason & Cook*, no. X-86 is especially similar to *Fernald & Wiegand*, no. 2753. Also the spikelets of the Puerto Rican material, like those of the continental *R. alba*, are 1–3-fruited and usually (if 1-fruited, invariably) terminated by a sterile floret; and the achenes are identical with those of *R. alba* in all particulars.

Pfeiffer[1] has published *R. alba* var. *meridianus*, based on specimens collected by Lützelburg in northeastern Brazil. He states in the description that the bristles are 6–8, which seems to indicate that his plants vary, at least in this respect, from the typical. Unfortunately, I have not seen any of his material, for it would be interesting to compare it with the specimens from Puerto Rico.

Forma **laeviseta,** f. nov. Setis praeter basem sparse plumosam laevibus.—Occurs commonly with the typical form in Newfoundland; less commonly in eastern Quebec and Nova Scotia; infrequent in Pennsylvania, the vicinity of the Great Lakes and British Columbia. NEWFOUNDLAND: wet depressions and borders of rills on peaty slopes, Great Barachois (or Barasway Bay), District of Burgeo and La Poile, Sept. 11, 1926, *Fernald, Long & Fogg*, no. 119 (G); bare spots on peaty and gravelly slopes, French (or Tweed) Island, Bay of Islands, Sept. 2, 1926, *Fernald, Long & Fogg*, no. 118 (G, TYPE); wet bog-barrens, Trepassey, Avalon Peninsula, Aug. 16, 1924, *Fernald, Long & Dunbar*, no. 26344 (G); shallow pond-holes in tundra west of

[1] Fedde, Rep. Spec. Nov. xxxiii. 210 (1933).

Rushy Pond, Valley of Exploits River, Aug. 28, 1911, *Fernald & Wiegand*, no. 4718 (G); heath on diorite tableland, Lookout Mt., Bonne Bay, alt. about 380 m., Aug. 26, 1910, *Fernald & Wiegand*, no. 2753 (G); marsh west of Force le Plain pool, Harry's Brook, Aug. 9, 1929, *R. B. Kennedy*, no. 71072 (G); patches of damp peat with Utricularia, Middle Ridge, July 26, 1937, *Moir*, no. 41 (G). Miquelon: maricages, tourbière près du pont de Miquelon, July 31, 1901, *Arsène*, no. 98 (G). Quebec: dans la grande tourbière, Saint Charles de Bellechasse, Aug. 11, 1925, *Rousseau*, no. 20224 (G); sphagnum swamp, Natashquan, Saguenay Co., Sept. 4, 1915, *St. John*, no. 90201 (G). Nova Scotia: sphagnous pockets in sandy plains, Middleton, Annapolis Co., July 20, 1920, *Bean & White*, no. 20267 (G). Pennsylvania: vicinity of Allentown, Lehigh Co., *Pretz*, no. 7793 (P); open (calcareous) marshy meadow, vicinity of Allentown, Lehigh Co., *Pretz*, no. 10361 (P). Wisconsin: Oneida Reservation, July 12, 1881, *Schuette* (G). British Columbia: Lulu Island, Aug. 11, 1938, *Eastham* (NY).

7. R. macra (Clarke) Small. Caespitose: leaves 1.5–3.5 mm. wide, flat, ascending; upper margins serrulate: culms erect, slender, acutely trigonous, 3.9–7.2 dm. high: terminal fascicle turbinate to corymbiform, 1.3–3 cm. wide; 1–2 lateral fascicles smaller, on slender exserted peduncles: spikelets ovoid, 4–5 mm. long, invariably 1-flowered, with the achene terminating the axis: scales mucronulate, rusty: bristles 18–20, obviously arranged in at least two series, connivent, exceeding the tubercle; the barbs of the distal portion retrorse, reversing their direction in the proximal half, and lengthened into a few hairs at the base: achene pyriform, lenticular, 1.3–1.4 mm. wide, 2–2.1 mm. long; the base somewhat attenuate as in *R. alba;* the surface obscurely rugulose, pale over the umbonal region, irregularly lined, then generally darkened toward the margins: tubercle narrowly subulate, compressed, 1 mm. long; the base not including the summit of the achene. Plate 820, figs. 3A and 3B; Map 12.—Man. 180 (1933). *R. alba* var. *macra* Clarke ex Britton, Trans. N. Y. Acad. Sci. xi. 88 (1892); Small, Fl. 194 (1903). *R. alba* sensu Chapman, Fl. So. U. S. 527 (1860), in part, non Vahl. *Triodon albus* Farwell, var. *macer* Farwell, Rep. Mich. Acad. Sci. xix. 253 (1917). *Phaeocephalum album* House var. *macrum* Farwell, Rep. Mich. Acad. Sci. xxi. 361 (1920).—Bogs of Coastal Plain from Georgia west to eastern Texas. Georgia: wet sloping bog, Coffee Co., *Harper*, no. 716 (G, NY). Florida: Liberty Co., Aug. 1886, *Curtiss* (US); wet springy places, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 861a (G, US); "*Rhyn. alba* with many bristles," *Chapman* (G). Mississippi: Biloxi, Harrison Co., *Tracy*, no. 4886 (NY, US); Mississippi City, Harrison Co., *Lloyd & Tracy*, no. 380 (NY).

TEXAS: sandy bogs, Grapeland, Houston Co., *Palmer*, no. 14404 (Mo) and no. 12844 (Mo); 2 miles south of Grapeland, Houston Co., *Cory*, no. 26080 (CU); *Drummond*, no. 281 (NY, ISOTYPE, immature).

This species, known only from Georgia, Florida, Mississippi and Texas,[1] was set off from *R. alba* Vahl by Clarke. He described it as having "clusters larger, sometimes 3 mm. broad, bristles more numerous 15–20." In 1933 Small elevated *R. alba* var. *macra* Clarke to specific rank without adding anything of note to the original description. On examination, however, the spikelets of *R. macra* prove to differ from those of *R. alba* in several characters. In the former species each spikelet is invariably 1-flowered so that the single maturing achene terminates the axis. In *R. alba*, on the contrary, each spikelet is 2- (more rarely) 3-flowered. Commonly two achenes mature, the uppermost of which may or may not terminate the axis, depending upon the presence or absence of a third almost invariably sterile floret. If the spikelet is 1-fruited, however, the achene is always succeeded by a sterile floret. It is the presence in *R. macra* of a consistently 1-flowered spikelet, coupled with its generally grosser habit, its increased number of bristles, and larger achene that leads me to agree with Small in thinking it to be a good species.

8. R. KNIESKERNII Carey. Caespitose: leaves filiform-setaceous to 1.8 mm. wide, involute when dry, smooth, becoming serrulate on margins and keel: culm slender to filiform, flexuous, 1.5–5 dm. high: terminal fascicle 0.4–1 cm. wide; 2–3 lateral fascicles remote at intervals along the entire length of the culm, with peduncles included: spikelets ovoid, 2–2.8 mm. long, subsessile, 2–3-fruited, terminated by a sterile floret: scales caducous, castaneous to dark brown; lower scales apiculate, upper ones slightly so: bristles 6, stiffly erect, retrorsely barbellate, falling short of to barely exceeding the body of the achene: achene obovoid, 0.6–0.8 mm. wide, 1.1–1.3 mm. long, lenticular, biconvex, nearly imperceptibly rugulose, a shining yellow-brown in the center, becoming fragmentarily lined, then generally darker toward the margins: tubercle deltoid-subulate, compressed, 0.4–0.6 mm. high. PLATE 819, FIGS. 2A and 2B; MAP 11.—Am. Journ. Sci. Ser. 2: iv. 25 (1847); Gray, Man. 533 (1848); Britton & Brown, Ill. Fl. i. 278, fig. 653 (1896); Britton, Man. 185 (1901); Robinson & Fernald in Gray, Man. ed. 7: 201, fig. 325 (1908). *R. Grayana* Knieskern ex Carey, Am. Journ.

[1] Reports of *R. macra* from New England are erroneous, being founded on specimens of *R. alba* exhibiting gigantism.

Sci. Ser. 2: iv. 25 (1847), *as synonym*, non *R. Grayii* Kunth. *Phacocephalum Knieskernii* (misspelled *Kneiskernii*) House, Am. Midland Nat. vi. 202 (1920).—Moist places in pine barrens of New Jersey and Delaware. New Jersey: Point Hollow, 1843, *Knieskern* (NY, type, annotated by Carey); pine woods, Shark River, Monmouth Co., *Mackenzie*, no. 8003 (NY, P); (on bog iron ore?) sandy bogs southeast of Bamber, Ocean Co., Aug. 25, 1909, *Long* (G, P); dominant on iron ore banks near Atsion, Burlington Co., Aug. 26, 1867, *Parker*, (G, P); moist humus, Parkdale, Camden Co., *Pennell*, no. 9030 (NY); pinelands, Egg Harbor City, Atlantic Co., *Mackenzie*, no. 8050 (NY). Delaware: swamps, Baltimore Hundred, Sussex Co., Sept. 10, 1875, *Commons* (P); swamp, near Gumboro, Sussex Co., Aug. 5, 1874, *Commons* (P).

First distributed under the herbarium-name, *R. Grayana* Knieskern, this rare little species of the New Jersey and Delaware pine barrens was later described and published by Carey in 1847 as *R. Knieskernii*, the change in name being made because of *R. Grayii* of Kunth, 1839.

9. R. capillacea Torr. Caespitose: leaves filiform-setaceous, involute, at least on drying, becoming slightly carinate then serrulate on keel and margins: culms flexuous-erect, capillary, 0.9–4 dm. high: fascicles ovoid, erect with 1–10-spikelets, 3–8 mm. wide; the single lateral fascicle remote on a subincluded peduncle: spikelets lanceolate to fusiform, 5–6 mm. long, erect, sessile or nearly so, 1–5-fruited: fertile scales castaneous to dark brown with the prominent midrib prolonged into a short mucro: bristles 6, erect to ascending, retrorsely barbellate, falling short of to exceeding the tubercle: achene 0.8–1 mm. wide, 1.8–2 mm. long, oblong-elliptic, lenticular, with a very narrow gynophore, obscurely rugulose, the central region pale, irregularly lined, then generally darkened toward the margins: tubercle compressed, attenuate-subulate, 0.8–1.6 mm. tall. Plate 818, figs. 2A and 2B; Map 10.—Fl. N. and Mid. St. i. 55 (1823) and Ann. Lyc. N. Y. iii. 366 (1836); Gray, Gram. et Cyp. i. no. 95 (1834) and Ann. Lyc. N. Y. iii. 214, pl. 6, fig. 25 (1835) and Man. 533 (1848); Britton & Brown, Ill. Fl. i. 278, fig. 652 (1896); Britton, Man. 185 (1901); Robinson & Fernald in Gray, Man. ed 7: 201, fig. 324 (1908). *R. setacea* (Muhl.) MacMillan, Metasp. Minn. Valley, 104 (1892), non Vahl. *Schoenus setaceus* Muhlenberg, Descrip. Gram. 6 (1817), non Vahl. *Triodon capillaceus* [*a*] Farwell, Rep. Mich. Acad. Sci. xv. 167 (1913). *Phaeocephalum capillaceum* Farwell, Rep. Mich. Acad. Sci. xxi. 361 (1920).—Sporadic in marly bogs and on calcareous ledges from the western coast of Newfoundland through southern Pennsyl-

vania; more common inland in the region of the Great Lakes (excepting Lake Superior), south through Ohio, with scattered stations in western Virginia, Tennessee, northern Iowa, northern North Dakota, and Saskatchewan, and a concentration in southeastern Missouri. Cited specimens of this clear-cut species are limited to those from the extremities of the range. NEWFOUNDLAND: in bogs, Bonne Bay, July 26, 1930, *Jansson* (G, f. *leviseta*); Harry's Brook near Dump Pool, *R. B. Kennedy*, no. 920 (G, f. *leviseta*). QUEBEC: open spots, marly Arbor Vitae swamps, mouth of Bonaventure River, Bonaventure Co., *Collins, Fernald & Pease*, no.4774 (G). NEW BRUNSWICK: crevices of wet calcareous ledges, Gorge of Aroostook River, Victoria Co., *Robinson & Fernald* in Pl. Exsic. Gray., no. 44 (CA, CU, G, NE, NY, P, US). MAINE: calcareous ledges, Ft. Fairfield (above mouth of Aroostook River), Aroostook Co., July 11, 1893, *Fernald* (NE); ledgy river bank, Winslow, Kennebec Co., *Fernald*, no. 2785 (NE, f. *leviseta*). VERMONT: 4th of July Slide, Mt. Willoughby, Orleans Co., Aug. 15, 1896, *Faxon* (NE, NY, US). CONNECTICUT: border of pond, Salisbury, Aug. 28, 1910, *Phelps* (G, NE). NEW YORK: Watertown, Jefferson Co., 1834, *Gray* (NY, cited by Gray). NEW JERSEY: limestone sink, White Pond, Sussex Co., *Mackenzie*, no. 4766 (NY); marl beach, White Pond, Warren Co., *Griscom*, no. 12120 (G). PENNSYLVANIA: one mile east of Johnsonville, Northampton Co., Sept. 2, 1907, *Van Pelt* (G, P); in limestone, Dillerville Swamp, Lancaster Co., July 16, 1901, *Heller* (G; US, no. 4839). VIRGINIA: boggy meadow fed by springs in limestone area, vicinity of Watauga, Washington Co., *Carr*, no. 585 (Penn.) OHIO: cedar swamp, Champaign Co., *Werner*, no. 170½ (NY); rather abundant in bog, Cedar Swamp, vicinity of Tremont City, Clark Co., *Leonard*, no. 2090 (US); Paxton, Ross Co., Aug. 1933, *Pontius & Bartley* (US). TENNESSEE: dolomitic limestone, Cedar Creek, Campbell Co., *Underwood*, no. 163 (CU). IOWA: bog, Estherville, Emmet Co., *Walden*, no. 1113 (G); marshy zone around springs emerging from a knoll 5 miles east of Ruthven south of the viaduct over Highway 18, Highland, Palo Alto Co., *A. Hayden*, no. 742 (G, P); abundant, forming a zone around a hanging bog, southwest of Silver Lake, Silver Lake, Dickinson Co., *A. Hayden*, no. 10886 (P); marshy plain in a hanging bog, Logan, Clay Co., *A. Hayden*, no. 8040 (NY). NORTH DAKOTA: Turtle Mts., Bottineau, Bottineau Co., alt. 2000 ft. July 25, 1896, *Barber* (US). SASKATCHEWAN: bog, rare, 4 miles southwest of Wallwort, *Breitung*, no. 1373 (G).

Forma LEVISETA (E. J. Hill) Fernald. Bristles smooth, otherwise identical with *R. capillacea*.[1]—RHODORA, XXXVII. 252 (1935).

[1] For discussion see treatment of *R. capitellata* f. *discutiens*.

Var. *leviseta* E. J. Hill ex Gray, Am. Nat. x. 370 (1876); Britton & Brown, Ill. Fl. 278 (1896); Britton, Man. 185 (1901); Robinson & Fernald in Gray, Man. ed. 7: 201 (1908). *Phaeocephalum capillaceum* var. *levisetum* Farwell, Rep. Mich. Acad. Sci. xxi. 361 (1920).—Occasional in the range of the typical form in Newfoundland, Maine and the area of the Great Lakes. With the exception of the type, representative specimens of f. *leviseta* have been cited with those of the typical form. Indiana: wet pine barrens, Pine Station, head of Lake Michigan, July 28, 1875, *Hill* (G, type of var. *leviseta*).

Asa Gray, in reporting var. *leviseta* for Hill, mentions another possible variety of *R. capillacea*, characterized by 12 setae and a short "stipe" which had been collected in Herkimer County, New York by J. A. Paine, 1864. The sheet in the Gray Herbarium labeled Litchfield, Hidden Lake, Herkimer County, New York, *John A. Paine*, 1864, is mixed. The two specimens with achenes bearing as many as 12 bristles are poorly developed *R. alba* (L.) Vahl.

Series 2. Plumosae (Clarke) Small, emend. Plants of damp or exsiccated pine barrens on the Coastal Plain, the West Indies and Central America. Caespitose: leaves filiform to 3 mm. wide: culms capillary to slender: inflorescence reduced to a few spikelets or 1–2 spiciform or corymbiform fascicles: spikelets usually 1– (rarely 2–3)-fruited, pedicellate to sessile: scales castaneous to pale brown, tightly imbricated: bristles heavily plumose in at least their lower portions; tips antrorsely serrulate; rarely reduced to 6 plumose tufts: achene rugulose to ridged, emarginate, usually rotundly obovoid: tubercle conical.—Man. 175 (1933). *Rhynchospora*, Series B. *Diplostyleae*, Sect. 2, *Plumosae* Clarke in Urban, Symb. Ant. ii. 105 (1900), in part. *Rhynchospora* § *Eriochaete* Gray in Torr. Ann. Lyc. N. Y. iii. 363 (1836); Steud. Cyp. 139 (1855).

Key to Species in Series Plumosae

Spikelets 1–5, remote on 1–2 slender branchlets, the lowermost of which is abruptly divergent. . . . . 10. *R. oligantha.*
Spikelets numerous, congested in ovoid to spiciform fascicles.
  Fascicles ovoid to irregularly corymbose; achene 1.4–1.7 mm. wide, 2–2.2 mm. long; leaves 2–3 mm. wide. . . . . 11. *R. intermedia.*
  Fascicles spiciform; achene 1.1–1.4 mm. wide, 1.4–1.8 mm. long; leaves filiform to 1 mm. wide. . . . . 12. *R. plumosa.*

10. R. oligantha Gray. Densely caespitose: leaves filiform-setaceous, canaliculate, smooth, blunt-tipped, ascending: culms capillary, erect or often weak, leafless, 1.6–3.7 dm. tall: inflorescence reduced to 1–2 elongate capillary branchlets, the one erect and with 1–2-spikelets, the other abruptly divergent, with 1–3-

spikelets, subtended by a long filiform erect often circinately-tipped bract which appears as a continuation of the culm; rarely a single remote lateral spikelet present: spikelets ovate to lanceolate in outline, with 2–4 florets, 1–3-fruited, pale cinnamon-brown, 4–7 mm. long; scales ovate, sometimes mucronulate, tightly imbricate: bristles 6, partially plumose, slightly shorter than the achene to exceeding the tubercle or reduced to tufts: achene broadly elliptic or ovate, subterete, 1.6–2 mm. wide, 2–2.6 mm. long, horizontally rugulose with faint longitudinal striae: tubercle conical, 0.3–0.6 mm. in height.

10a. Var. **typica.** Bristles slightly shorter than the achene to exceeding the tubercle; the lower portion covered by dense, reddish, silvery-tipped hairs; the upper portion upwardly hispidulous: achene broadly elliptic, subterete, 1.6–2 mm. wide, 2.3–2.6 mm. long, occasionally having a trace of a bluish bloom over the castaneous to dark brown surface; the summit noticeably constricted under the wide basal flange of a conical-attenuate tubercle (0.4–0.6 mm. in height). PLATE 821, FIGS. 2A and 2B; MAP 15.—*R. oligantha* Gray, Ann. Lyc. N. Y. iii. 212, pl. 6, fig. 22 (1835); Chapman, Fl. So. U. S. 524 (1860), in part var. *breviseta* Gale; Gray, Man. ed. 6: 585 (1890); Britton & Brown, Ill. Fl. i. 277, fig. 650 (1896); Britton, Man. 184 (1901), var. *breviseta* as to specimens from Florida; Small, Fl. 194 (1903) and Man. 180 (1933); Robinson & Fernald in Gray, Man. ed. 7: 200, fig. 321 (1908).—Open bogs of the New Jersey Pine Barrens and Delaware; North Carolina, southern Georgia and westward along the coast to Mississippi and eastern Texas; also in Central America. NEW JERSEY: peaty savanna-bog along Mullica River southeast of Atsion, Burlington Co., *Long*, no. 50410 (G, P); open pine bogs, 2 miles southeast of Chatsworth, Burlington Co., *Mackenzie*, no. 6085 (D, G, NY). DELAWARE: in a sandy bog near Lewes, Sussex Co., Aug. 15, 1895, *Commons* (G, P). NORTH CAROLINA: *Schweinitz* (NY, TYPE); pine barrens, Fayetteville, Cumberland Co., *Schweinitz*, no. 7 (P; labeled "Schoenus rariflorus El."). GEORGIA: wet pine barrens, Sumter Co., *Harper*, no. 1027 (G, US); in moist pine barrens forming clumps of wire grass, Sylvester, Worth Co., *Svenson*, no. 7263 (G). FLORIDA: west Florida, *Chapman* (P). ALABAMA: about swamp, Elberta, Baldwin Co., Aug. 24, 1924, *Wolf* (StB); low sandy soil, Mobile, Mobile Co., May 1, 1940, *Sargent* (Sargent Herb.). TEXAS: swamps, Swan, Smith Co., *Reverchon*, no. 2919 (G, Mo, US); bogs, Hempstead, Waller Co., *Hall*, no. 715 (G, US); *Drummond*, no. 282 (G).

10b. Var. **breviseta,** var. nov. Setis plerumque ad 6 cristas villorum argenteorum reductis; saepe 1–2 prolongatis apicem versus serrulatis achaenio duplo brevioribus: achaenio ovoideo 1.6 mm. lato 2 mm. longo, caeruleo-pruinoso; tuberculo breviter

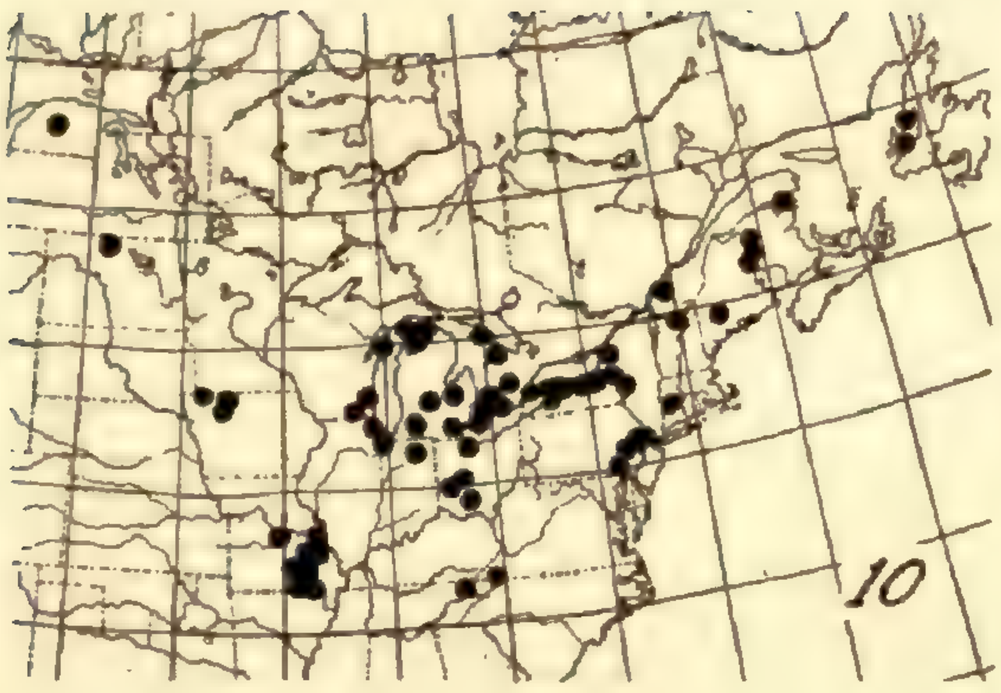
conico 0.3–0.4 mm. longo. Plate 821, fig. 2C; Map 14.—*R. oligantha* sensu Kükenthal, Fedde Rep. Spec. Nov. xxiii. 207 (1926) and xxxii. 76 (1933); non Gray.—Low areas in pine barrens and savannas, Florida Peninsula, western Cuba, Jamaica and Hispaniola. Florida: damp pine barren, Duval Co., *Fredholm*, no. 5179 (G); moist pine barrens near Jacksonville, Duval Co., June, *Curtiss*, no. 3165 (P, US); damp pine barrens near Jacksonville, Duval Co., June 19, 1896, *Curtiss*, no. 5687 (G, type; NC, US, isotypes); near Jacksonville, Duval Co., May 26, 1893, *Curtiss*, no. 4116 (US); low pine barrens, June, 1884, *Curtiss* (US); Winter Park, Orange Co., Apr. 1919, *Francis* (US); rather dry pine barrens about 1½ miles south of Starke, Bradford Co., May 13, 1909, *Harper*, no. 39 (US); cut-over flatwoods, west of Lake Reedy, Frostproof, Polk Co., May 7, 1931, *McFarlin*, no. 5138 (CU); Tampa, Hillsborough Co., May, 1876, *Garber* (G). Cuba: in slightly moist places (between Alcatrez Grande and Alc. Chico) at Laguna Restinga, Pinar del Rio, Nov. 18, 1923, *Ekman*, no. 18129 (NY, US); Laguna Restinga, between Palmarejo and Las Martinas, Pinar del Rio, Nov., 1923, *Ekman* (NY). Hispaniola: savanna in Rhexia association, not rare, El Valle, Sabana de la Mar, prov. de Samana, Cordillera Central, Santo Domingo, July 11, 1930, *Ekman*, no. 15652 (G, NY, US). Jamaica: in small patches amongst shrubs and grasses, Hollis's Savanna, Upper Clarendon, alt. 2400 ft., Jan. 12, 1915, *Harris*, no. 12249 (NY, US).

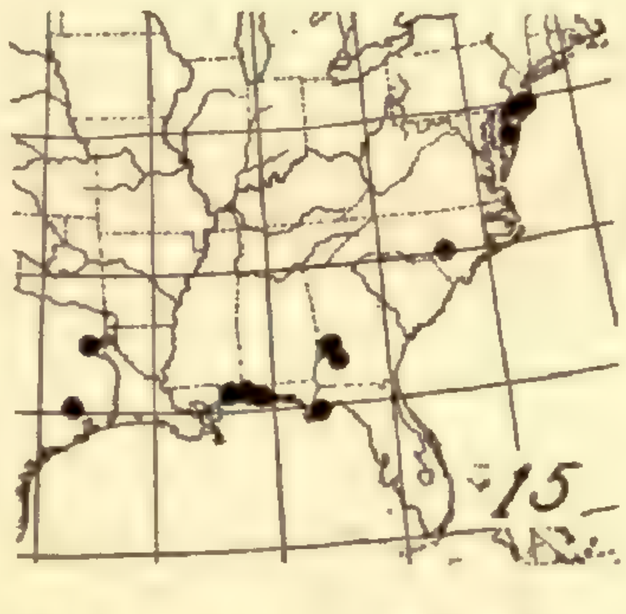
11. R. intermedia (Chapm.) Britt. Caespitose: leaves canaliculate, carinate, 2–3 mm. wide, margins mostly upwardly serrulate: culms terete, erect, slender, 2.5–6.7 dm. tall: fascicles 1, rarely 2, congested, irregularly corymbiform or broadly ovate in outline, 0.9–2.2 cm. wide; the lateral fascicle when present smaller and remote: spikelets ovoid, compact, sessile, with 1–2 florets, 1- (rarely 2-) fruited, 4.5–5.5 mm. long: fertile scales acute, castaneous: bristles 6, equalling or overtopping the tubercle, covered with long ascending silky white hairs which are diminished at the top to stiff upward serrulations: achene rotundly obovoid, transversely ridged to rugulose, evenly browned, 1.4–1.7 mm. wide, 2–2.2 mm. long: tubercle conical-apiculate, depressed, 0.6 mm. high. Plate 820, figs. 4A and 4B; Map 13.—Trans. N. Y. Acad. Sci. xi. 87 (1892), non Beyrich; Small, Fl. 194, 1327 (1903) and Man. 180 (1933). *R. plumosa* var. *intermedia* Chapman, Fl. So. U. S. 524 (1860). *R. pineticola* Clarke, Kew Bull. Add. Ser. viii. 40 (1908). *Phaeocephalum intermedium* House, Am. Midland Nat. vi. 202 (1920). Dry sandy pine barrens, peninsula of Florida. Florida: Hibernia, Clay Co., March, 1869, *Canby* (NY); Gainesville, Alachua Co., March, 1876, *Garber* (NY); dry pine barrens, Mosquito Inlet, Volusia Co., *Curtiss*, no. 3173 (CA, G, NC, NY, P, US); Lake Butler, Orange Co., *Beckwith*, no. 558 (US); Eustis, Lake

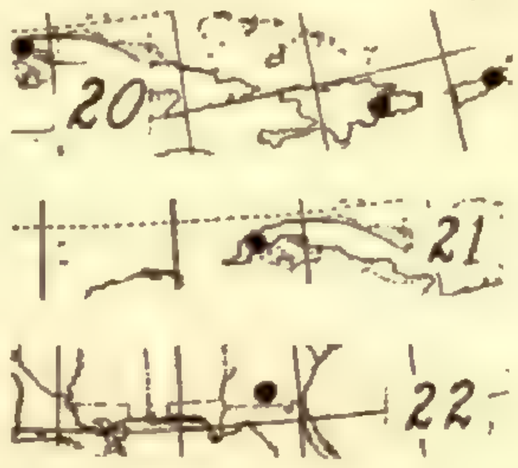
Co., *Nash*, no. 2020 (G, NY, P, US); dry pine barrens, Eau Gallie, Indian River, Brevard Co., *Curtiss*, no. 5703 (D, G, NY, US); hammock near St. Cloud, Osceola Co., *Small, DeWinkler & Mosier*, no. 11166 (NY); Tampa, Hillsborough Co., *Britton & Wilson*, no. 20 (NY); flatwoods, Lee Co., *Hitchcock*, no. 427 (G, NY, US); Palma Sola, Manatee Co., *Tracy*, no. 6998 (G, NY, US); Miami, Dade Co., June, 1877, *Garber* (G, P, US); dry sandy ridges near coast, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 4481 (G, NY, US).

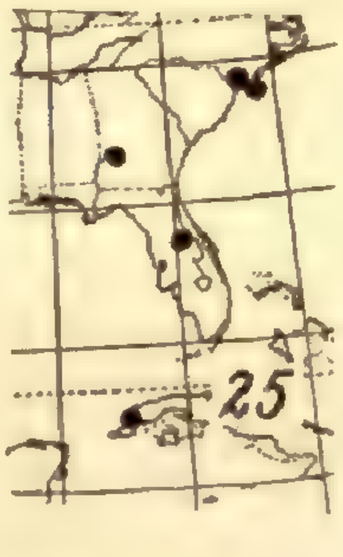
R. intermedia can be arbitrarily distinguished from *R. plumosa* on a basis of size. Its leaves are wider, the spikelets larger, and the achene 2–2.2 mm. long in contrast to 1.6–1.8 mm. long for that of *R. plumosa*. There is a pronounced tendency also for the fascicles of *R. intermedia* to be irregularly globose rather than elongated-spiciform.

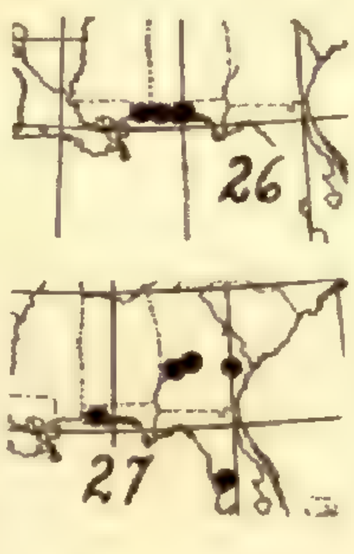
12. R. PLUMOSA Ell. Caespitose: leaves filiform to 1 mm. wide, canaliculate, becoming subtriquetrous and scabrous toward the apex, ascending or sometimes arching: culms stiffly erect, slender, terete, usually overtopping the leaves, 2.1–7.2 dm. high: inflorescence composed of several small fascicles aggregated at the summit of the culm so as to produce the effect of a congested cylindric spike, occasionally 3 cm. long, 1 cm. wide; a single remote lateral "spike" may also occur on a slender exserted peduncle: spikelets ovoid, tightly imbricate, with 1–3 florets, 1–2-fruited, 3–5 mm. long: scales obtuse to mucronulate, castaneous: bristles 6, falling short of the achene to exceeding the tubercle, thickly clothed with glistening white hairs which diminish more or less suddenly near the tip to antrorse serrulations: achene rotundly obovoid, transversely rugulose to ridged, evenly brown, 1.1–1.4 mm. wide, 1.4–1.8 mm. long: tubercle depressed, conical-apiculate or more rarely attenuate, sparingly serrulate. PLATE 820, FIGS. 2A and 2B; MAP 16.—Sk. Bot. S. Car. and Ga. i. 58 (1816); Gray, Ann. Lyc. N. Y. iii. 203, pl. 6, fig. 10 (1835); Chapman, Fl. So. U. S. 524 (1860); Clarke in Urban, Symb. Ant. ii. 123 (1900); Small, Fl. 194 (1903) and Man. 180 (1933); Britton, Mem. Soc. Cubana Hist. Nat. ii. 195 (1916). *R. semiplumosa* Gray, Ann. Lyc. N. Y. iii. 213, pl. 6, fig. 23 (1835); Chapman, Fl. So. U. S. 524 (1860); Small, Fl. 194 (1903) and Man. 180 (1933). *R. penniseta* Grisebach, Cat. Pl. Cub. 244 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 180 (1873). *Schoenus ciliaris* sensu Muhlenberg, Descrip. Gram. ii (1817), non Michaux. *Phaeocephalum plumosum* House, Am. Midland Nat. vi. 202 (1920).—Open, sandy, dry to moist ground mostly in pine barrens of the Coastal Plain from North Carolina south to the tip of Florida, and west to Texas; also in the western provinces of Cuba, the Isle of Pines

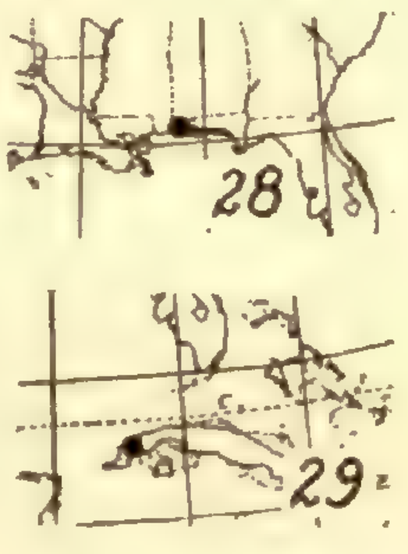


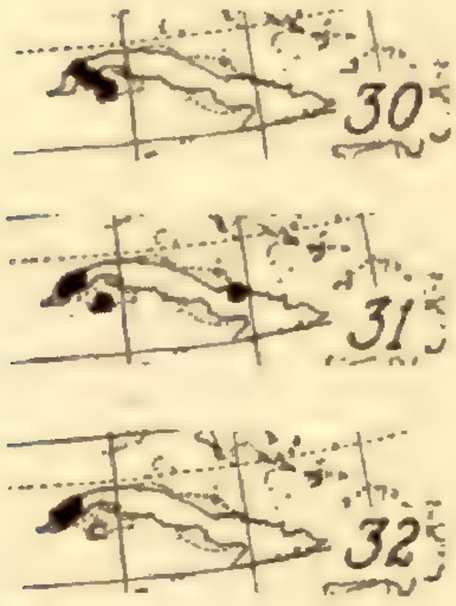












Range of 10, Rhynchospora capillacea; 11, R. Knieskernii; 12, R. macra; 13, R. intermedia; 14, R. oligantha, var. breviseta; 15, R. oligantha, var. typica; 16, R. plumosa; 17, R. ciliaris; 18, R. pallida; 19, R. Chapmanii; 20, R. brachychaeta; 21, R. sola; 22, R. solitaria; 23, R. nuda; 24, R. fusca; 25, R. pleiantha; 26, R. Curtissii; 27, R. Harperi; 28, R. crinipes; 29, R. fuscoides; 30, R. leptorhyncha; 31, R. Gageri; 32, R. joveroensis; 33, R. Baldwinii; 34, R. Fernaldii; 35, R. filifolia

and Central America. North Carolina: dry savanna, 15 miles southeast of Greenville, Pitt Co., *Blomquist*, no. 11252 (D); savanna at Chocowinity, Beaufort Co., *Godfrey*, no. 5403 (G); sandy soil, marsh, Harker's Island, Carteret Co., *Randolph & Randolph*, no. 843 (G); moist black soil, low ground, Dixon, Onslow Co., *Randolph & Randolph*, no. 946 (G); savanna at Burgow, Pender Co., *Godfrey*, no. 4736 (G, NC); sandy pine barrens, west of Leland, Brunswick Co., *Wiegand & Manning*, no. 619 (G); dry sandy soil, Fayetteville, Cumberland Co., *Biltmore Herb.*, no. 243b (CU, G, P). South Carolina: peaty excavated area in savanna at side of road, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 7 (CU, D, G, NY, P); ½ mile south of Manning, Clarendon Co., *Stone*, no. 713 (P); open white sandy, oak-pine woods, 1 mile east of Eutawville, Orangeburg Co., *Godfrey & Tryon*, no. 833 (G). Georgia: in pinetis aridis, Geor. Car., *Elliott* (G, type-photo); moist pine barrens, Bullock Co., *Harper*, no. 893 (G, NY); low pine barrens southeast of Dublin, Laurens Co., *Harper*, no. 1372 (G, NY, US); moist rocks near Ohoopee River, Tattnall Co., *Harper*, no. 2156 (G, US); pine barren, 2 miles south of Savannah, Chatham Co., *Eyles*, no. 6087 (CU); pine barrens a few miles east of Eulonia, McIntosh Co., *Eyles*, no. 6437 (CU); dominant in piney woods, Billy Island, Charleton Co., Bradley, no. 1 (P); moist pine barrens, Coffee Co., *Harper*, no. 706 (NY, US); forming wiry clumps in moist pine barrens south of Sylvester, Worth Co., *Svenson*, no. 6936 (CA, G); pine barren, north of Hahira, Cook Co., *Eyles*, no. 3796 (CU); damp margin of cypress pond, about 1 mile north of Jakin, Early Co., *Harper*, no. 3629b (NY). Florida: dry pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 4867 (G, NY, US); north of Macclenny, Baker Co., *Eyles*, no. 5864 (CU); Hibernia, Clay Co., March, 1869, *Canby* (G, P, US); Cypress-Ilex-Myrt. swamp, west of Lawtey, Bradford Co., *West & Arnold* (CU); in a wet ditch in pineland, Gainesville, Alachua Co., *O'Neill*, no. 621 (CU); moist flatwoods, Welaka, Putnam Co., June 29, 1939, *Laessle*, no. 17 (CU); low pine barren, Okeechobee Region, Brevard Co., *Fredholm*, no. 5740 (G); in a low pineland, Aripeka, Pasco Co., *Leonard*, no. 1414 (CU); Tampa and vicinity, Hillsborough Co., May, 1897, *Berg* (NY); in dry sandy soil, about 5 miles north of Parrish, Manatee Co., *Moldenke*, no. 1052 (D, NY); Punta Gorda, DeSoto Co., *Eaton*, no. 1284 (G); in moist sandy soil at edge of ditch, Fort Myers, Lee Co., *Moldenke*, no. 675 (D, NY); Miami, Dade Co., Mar., 1877, *Garber* (G, P); in low pineland, Otter Creek, Leon Co., *O'Neill*, no. 725 (CU); Apalachicola prairies, Franklin Co., *Small, DeWinkler & Mosier*, no. 11248 (NY); boggy turfy sandy meadow, 7 miles west of Sneads, Jackson Co., *Wiegand & Manning*, no. 678 (G); moist pine barrens, Argyle, Walton Co., *Curtiss*, no. 6488 (G, NC, NY, US); small

savanna near coastal highway, about 12 miles east of Pensacola, Santa Rosa Co., *Harper*, no. 3745 (G, NY). Alabama: Gateswood, *Tracy*, no. 8617 (G, NY, US); Mobile, Mobile Co., *Sullivant* (G). Mississippi: Ocean Springs, Jackson Co., *Skehan*, no. 22617 (G); Biloxi, Harrison Co., *Tracy*, no. 4861 (G, US). Louisiana: open pineland, 1 mile north of Abita Springs, St. Tammany Parish, *Pennell*, no. 4154 (NY); New Orleans, 1834, *Dr. Ingalls* (NY, type of *R. semiplumosa*, very immature); wet prairies, Welsh, Jefferson Davis Parish, *Palmer*, no. 7669 (CA, Mo, P, US); low prairies, vicinity of Lake Charles, Calsasieu Parish, *Mackenzie*, no. 444 (Mo, NC, NY). Texas: San Antonio, Bexar Co., Sept. 20, 1891, *Plank* (NY); E. Tex., *Wright* (G). Cuba: in sandy pinelands close to the laguna, Laguna Santa Maria, Pinar del Rio, *Ekman*, no. 17250 (G); moist places, Mateo Sanchez, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17941 (US); pine woods, Herradura, Pinar del Rio, *Earle*, no. 756 (NY, US); Vinales, Pinar del Rio, *Leon*, no. 18905 (CU); Pinales, Los Almacigos Pinar del Rio ? July 29, and high pinales, Vinales, Pinar del Rio, Mar. 1, *Wright*, no. 3398 (G; NY, US, same number without locality); savanna, San Pedro and vicinity, Isle of Pines, *Britton & Wilson*, no. 14296 (G, NY, US); vicinity of Sopopo, Buenos Aires, Trinidad Mt., Santa Clara, *Smith, Hodgdon & Gonzalez*, no. 3341 (CU, G, US).

Series 3. **Chapmaniae,** ser. nov. Inflorescentia saepe e fasciculo solitario terminali composita: spiculis sterilibus fusiformibus saepe numerosis: setis antrorse serrulatis achaenio duplo brevioribus vel nullis rare 3–4 fragilibus tuberculo aequalibus: achaenio obovato elliptico vel fere orbiculari lenticulari valde compresso punctato vel foveolato vel laevi: tuberculo basi lato brevi saepe apiculato.

Plants mostly of low pinelands, occasionally standing in shallow water of ponds of the Coastal Plain and the West Indies. Habit stoloniferous or caespitose: leaves filiform to 6 mm. broad in *R. ciliaris:* culms erect to loosely ascending, usually slender to filiform: inflorescence often consisting of the solitary terminal fascicle: spikelets of several species split open by the developing achene; fusiform sterile spikelets numerous: bristles usually none to rudimentary, equalling the tubercle only in *R. solitaria* but then extremely fragile and less than six, antrorsely serrulate: achene obovate to elliptic or nearly orbicular, lenticular but usually strongly compressed, pitted (rarely faintly rugulose) to smooth, with or without a central disc: tubercle broad-based, short, often apiculate.—*Rhynchospora* III. *Pusillae* Small, Man. 175 (1933), in part. *Rhynchospora*, Series B. *Diplostyleae*, Divisio 4. *Psilocarya*, Sect. ii. *Pauci-Nucigerae* Clarke, Kew Bull. Add. Ser. viii. 119 (1908), in part.

(*To be continued*)

RHYNCHOSPORA, SECTION EURHYNCHOSPORA, IN CANADA, THE UNITED STATES AND THE WEST INDIES

Shirley Gale

(*Continued from page 134*)

Key to Species in Series Chapmaniae

a. Surface of achene pricked by tiny dark pits with the exception of the smooth region of the disc, or, if the pits are obscured, the 3–4 bristles equalling the tubercle....*b.*
  b. Basal leaves 4–6 mm. wide, obtusely tipped, short, forming a rosette; distal portion of the midribs of at least the lower floral scales conspicuously and upwardly ciliate ..... 13. *R. ciliaris.*
  b. Basal leaves 2.5–3 mm. wide, acute, elongate, erect; floral scales not ciliate....*c.*
    c. Bristles 3–4, equalling the tubercle..... 14. *R. solitaria.*
    c. Bristles 2–3, rudimentary..... 15. *R. sola.*
a. Surface of achene polished or minutely striate as the result of the crowding of small inconspicuous oblong alveoli; bristles absent or rudimentary....*d.*
  d. Fascicles 1–3, mostly ovoid; tubercle triangular-subulate; scales acute to aristulate..... 16. *R. brachychaeta.*
  d. Fascicles solitary, corymbiform; tubercle triangular to triangular-apiculate; scales with aristate tips at least 0.3 mm. long....*e.*
    e. Bases typically bulbous, sheathed by short fibrous acute ovate scales; floral scales silvery to reddish..... 17. *R. pallida.*
    e. Bases not enlarged; scales yellowish-brown to chestnut..*f.*
      f. Achenes homogeneously pale, not lustrous, 1.2–1.3 mm. wide, 1.5 mm. long; fascicles exceeded by 1–2 short, stiff bracts..... 18. *R. nuda.*
      f. Achenes pale except for a conspicuous dark patch at the base and apex, glossy, 0.8–1 mm. wide, 1–1.2 mm. long; fascicles exceeded by long setaceous bracts which are often somewhat circinate....19. *R. Chapmanii.*

13. R. ciliaris (Michx.) Mohr. Coarsely tufted: basal leaves short, suggesting a rosette, flat, 4–6 mm. wide, their margins and narrow keels silvery-ciliate; median and costal veins conspicuous; tips characteristically obtuse: culms terete or nearly so, stiffly erect, smooth or minutely hirsute, 3.3–8.9 dm. tall: inflorescence usually a single corymbiform to hemispherical fascicle, 1.2–2.1 cm. wide, rufous-brown, rarely accompanied by a smaller lateral fascicle on an included peduncle: spikelets ovoid, sessile, 3-flowered, 1–2-fruited, 4.5–6 mm. long: ultimate floral bracts and distal portions of the midribs of the lower scales upwardly ciliate: stamens 1–2: bristles 6, brittle, not exceeding ½ the achene in length, often rudimentary, upwardly serrulate: achene broadly elliptic, strongly lenticular, 1.5–1.6 mm. wide, 1.6–1.8 mm. long; the surface pricked by minute pits and dark

brown except for the smooth pale central disc: tubercle broadly deltoid, compressed, 0.4–0.6 mm. high, usually wrinkled and slightly encrusted by the summit of the achene. Plate 822, figs. 2A and 2B; Map 17.—Contrib. U. S. Nat. Herb. vi. 408 (1901); Small, Man. 183 (1933). *Schoenus ciliaris* Michaux, Fl. Bor.-Am. i. 36 (1803). *R. ciliata* Vahl, Enum. ii. 235 (1806); Gray, Ann. Lyc. N. Y. iii. 209, pl. 6, fig. 19[1] (1835); Chapman, Fl. So. U. S. 526 (1860); Small, Fl. 196 (1903); Britton, Trans. N. Y. Acad. Sci. xi. 90 (1892). *R. Rappiana* Small, Man. 179, 1503 (1933). *Phaeocephalum ciliatum* House, Am. Midland Nat. vi. 201 (1920).—Boggy savannas and low pinelands of the Coastal Plain from North Carolina southward throughout the peninsula of Florida and west to eastern Louisiana. North Carolina: savanna at Newport, Carteret Co., *Godfrey*, no. 5772 (G); moist black soil, low ground, Dixon, Onslow Co., *Randolph & Randolph*, no. 954 (G); pineland near Carolina Beach, New Hanover Co., *Godfrey*, no. 4699 (G); Supply Road, Southport, Brunswick Co., *Blomquist*, no. 5653 (D); pineland at Hallsboro, Columbus Co., *Godfrey*, no. 6252 (G, NC). South Carolina: grass-sedge bog or savanna, 12 miles northwest of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 747 (D, G, NY, P); grass-sedge bog or savanna, 3 miles southwest of Manning, Clarendon Co., *Godfrey & Tryon*, no. 924 (G, NY); Sumter, Sumter Co., *Bartram*, no. 3288 (P). Georgia: rather dry pine barrens, Coffee Co., *Harper*, no. 701 (G, US); intermediate pine barrens, Suwannee Lake, Ware Co., *J. S. Harper*, no. 84 (D, P); rather dry pine barrens south of Empress, Brooks Co., *Harper*, no. 1630 (G, NY, US); dry soil, Valdosta, Lowndes Co., May 27, 1940, *Sargent* (Sargent Herb.); moist pine barrens, Bullock Co., *Harper*, no. 887 (G, NY, US); pine barrens, Bethesda Church, Effingham Co., *Eyles*, no. 6106 (CU); in meadow, New England Camp, 8 miles north of Brunswick, Glynne Co., *Moldenke*, no. 5207 (NY); piney woods, Billy Island, Charleton Co., July 7, 1912, *Bradley* (P). Florida: moist pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 3146 (CU, D, G, P, US); Hibernia, Clay Co., March, 1869, *Canby* (G, US); left side Palatka Road about 1 mile from florist's, Gainesville, Alachua Co., *West & Arnold*, no. 7 (CU); low pineland near swamp on road between Deland and New Smyrna, Volusia Co., Sept. 11, 1926, *Dr. Ball*[2] (NY, type of *R. Rappiana*); juxta Tomoko Creek, Volusia Co., Michaux Herb. (G, type-photo of *Schoenus ciliaris;* NY, fragment from Michx. Herb.); low pineland, vicinity of Eustis, Lake Co., *Nash*, no.

[1] Figures 18 and 19 were apparently reversed in the printing. *R. ciliata* is fig. 19, not 18 as listed.

[2] The type of *R. Rappiana*, although undoubtedly sent to Small by Rapp, and, a year later, followed up by a collection made by Rapp himself, was actually collected by Dr. Ball as stated on the memorandum attached to the sheet.

534 (CU, G, NY, P, US); in sandy field about 3 miles west of Bithlo, Orange Co., *Moldenke*, no. 201 (D, NY); low pine barren, Okeechobee region, Brevard Co., *Fredholm*, no. 5177 (G, US); on the prairie, Kissimmee Park, Osceola Co., *O'Neill*, no. 6234 (CU); flatwood east of Loughman, Polk Co., *McFarlin*, no. 4282 (CU); Tampa, Hillsborough Co., Oct., 1877, *Garber* (G, P); in water's edge, near St. Petersburg, Pinellas Co., *Deam*, no. 2904 (G); Braidentown (? Bradenton), Manatee Co., *Tracy*, no. 7126 (G, NY, US); Istokpoga Prairie between Lake Istokpoga and Kissimmee River, Highlands Co., *Small & DeWinkler*, no. 9056 (NY); in a low pineland 11 miles east of Okeechobee City, Okeechobee Co., *O'Neill*, no. 7678 (CU); Dade Co., Nov.–Dec., 1903, *Eaton* (NY); wet pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 862a (G, NY, US). ALABAMA: swamp, Elberta, Baldwin Co., Aug. 21, 1926, *Wolf* (StB); common in swamp, Spring Hill, Mobile Co., *Bush*, no. 295 (NC, NY, US). MISSISSIPPI: Ocean Springs, Jackson Co., *Skehan*, no. 22632 (G); Biloxi, Harrison Co., *Tracy*, no. 6999 (G); Bay of St. Louis, Hancock Co., July 20, 1883, *Langlois* (US). LOUISIANA: in pine barrens, St. Tammany Parish, Sept. 14, 1892, *Langlois* (US).

Small compared his species, *R. Rappiana*, with *R. pallida* Curtis, but did not mention any possible relationship with *R. ciliaris*. However, Small's species has the short, blunt-tipped tuft of basal leaves with their silvery cilia, the ciliate bracts and scales, and the pitted, strongly lenticular achene of *R. ciliaris*. I cannot help but think that Small neglected to compare his material with the older species, as the two are unquestionably identical.

14. R. SOLITARIA Harper. Sparingly caespitose or solitary: leaves linear, erect, flat, 2.5–3 mm. wide, smooth with blunt tips: culms terete or nearly so, slender, erect, smooth, 5.2–6.4 dm. high: inflorescence a single turbinate to subhemispherical fascicle, 1.5 cm. wide: spikelets lanceolate to fusiform, 6–7 mm. long, acuminate, sessile, 1-flowered, split open by the maturing achene: scales chestnut, with an aristate tip 0.6–0.8 mm. long: stamens 2: bristles 3–4, extremely fragile, upwardly serrulate, equalling the tubercle: achene obovate, lenticular, 1.3 mm. wide, 1.4 mm. long; the surface, with the exception of a pale smooth disc, brown and pitted: tubercle triangular-apiculate, compressed, 0.6 mm. long. PLATE 822, FIGS 4A and 4B; MAP 22.—Bull. Torr. Bot. Cl. xxviii. 468 (1901); Small, Fl. 193 (1903) and Man. 182 (1933). *Phaeocephalum solitare* House, Am. Midland Nat. vi. 202 (1920).—Southern Georgia. GEORGIA: moist pine bar-

rens, Tifton, Berrien Co., *Harper*, no. 668 (NY, TYPE; G, ISOTYPE) and no. 1677 (G, US).

At first glance *R. solitaria* appears very similar to *R. pallida* M. A. Curtis, but its details—the simple non-tuberous bases, blunt-tipped leaves, terete culm, chestnut spikelets, aristate scales, well developed bristles and pricked surface of the achene—indicate that it is clearly a distinct species which, so far as I am aware, is known only from collections made in the type-locality.

15. R. **sola,** sp. nov. Planta laxe caespitosa: foliis erectis valde involutis saltem siccatis 1.0–1.5 mm. latis; apicibus obtusis: culmis subteretibus, tenuibus, erectis, saepe flexilibus, 3.2–5.7 dm. altis; inflorescentia ex fasciculo uno parvo compacto turbinato vel hemisphaerico 0.8–1 cm. lato constata; bracteis obscuris fasciculum non superantibus: spiculis lanceolatis, confertis, sessilibus 2-floris, monocarpis, 5 mm. longis: squamis mucronatis, dense imbricatis castaneis: setis 2–3, rudimentariis, antrorse serrulatis: achaenio valde lenticulari-obovoideo 1.1–1.2 mm. lato 1.2–1.6 mm. longo foveolato fusco; disco medio pallido: tuberculo compresso-deltoideo. PLATE 820, FIGS. 1A and 1B; MAP 21.—*R. fascicularis* sensu C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 180 (1873), in part; non (Michx.) Vahl. *R. distans* sensu Grisebach, Cat. Pl. Cub. 243 (1866), non (Michx.) Vahl.—Low pinelands of western Cuba. CUBA: pinales, Hato Quemado, Pinar del Rio, Nov. 20, 1862?,[1] and San Juan-Guanes, *Wright*, no. 3397, sheet labeled B (G, in part); *Wright*, no. 3397, sheet labeled A (G, TYPE); *Wright*, no. 3399 sheet labeled A (NY, in part)[2]; *Wright*, no. 3397, in Herb. Canby, no. 396 (US, in part); low savannas, Chirigota, Pinar del Rio, Oct. 26, 1863?,[3] Wright, no. 3399 (US, in part); Sabana de la Maguina, south of Pinar del Rio City, Pinar del Rio, November 28, 1940, *Léon & Alain*, no. 19422 (G).

With the exception of the Léon & Alain collection, no. 19422, *R. sola* is known only from specimens collected by Charles Wright and distributed as *R. distans* no. 3397 and *R. deflexa* Gris. no. 3399. I have seen 3 sheets of no. 3397; of the two located at the Gray Herbarium, one contains specimens of *R. sola* exclusively; this I am designating as the TYPE. The other sheet is mixed, containing on the left a specimen of *R. fascicularis* (Michx.) Vahl, var. *typica*. Sheet no. 3397 from the Canby

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905). Underwood misread "Quemado" as "Queniando."

[2] See footnote to *Wright*, no. 3399 under *R. fascicularis* (Michx) Vahl.

[3] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905).

Herbarium, now at the National Museum, is even more confusing. The specimen on the left is *R. sola*, that in the center, accompanied by two inflorescences, is *R. fascicularis* and that on the far right, *R. Wrightiana* Boeckl. A single sheet, no. 3399, from the Herbarium of the New York Botanic Garden contains a specimen of *R. sola*, located centrally and accompanied, right and left, by specimens of *R. fascicularis* to which the label *R. deflexa* pertains.

Although it is evident that the original distributor failed to distinguish between *R. sola* and *R. fascicularis*, these two species are not of the same series, and, once several important details have been observed, can be rather easily distinguished. As stated in the description, the leaves of *R. sola* end in a relatively abrupt blunt tip; and the slender culm bears, without exception, a single terminal fascicle which is subtended by inconspicuous bracts not exceeding the fascicle in height. The leaf-tips of *R. fascicularis* are triquetrous and attenuated; the culm usually bears one or more distant lateral fascicles, and the terminal fascicle is exceeded by a bract approximating twice the height of the fascicle. Occasionally young or reduced plants of *R. fascicularis* bear but a solitary terminal fascicle, but in all cases the spikelets remain divergent and ovoid in shape, not mainly ascending and ovate-lanceolate as those of *R. sola*.

Less obvious differences between the species are supplied by the details of the achenes. That of *R. sola* is obovoid, extremely lenticular, with a puncticulate surface, and accompanied by 2–3 rudimentary bristles. The achene of *R. fascicularis*, on the contrary, is subelliptic to suborbicular, markedly biconvex, with a smooth surface, and accompanied by six bristles varying in height from ½ the achene to exceeding the tubercle.

The natural affinities of *R. sola* lie, not with *R. fascicularis*, but with the very rare continental species, *R. solitaria* Harper, which is known only from its type-locality in Berrien County, Georgia. Although larger in all its parts than *R. sola*, this species also has obtusely tipped (but wider) leaves, a slender culm, and a single terminal fascicle. However, the lanceolate-acuminate to fusiform spikelets of *R. solitaria*, measuring 6–7 mm. long, are easily distinguished from the ovate-lanceolate (4–5 mm. long) spikelets of *R. sola*. The achenes again emphasize the close

relationship existing between the two species, for they are identical in both shape and surface-sculpturing, differing only in size, color, and the relative development of bristles.

The name, *R. sola*, has been selected because this species is closely related to *R. solitaria* and shares its characteristic feature of bearing only one fascicle.

16. R. BRACHYCHAETA (by error appearing as *brachychata*) C. Wright. Caespitose: leaves filiform, promptly involute, ascending, smooth except for the sparingly serrulate upper margins: culm terete or nearly so, filiform, wiry, flexuous, smooth, 3.5–5.2 dm. high: inflorescence of 1–3 remote fascicles, 0.6–1.2 cm. wide, usually oblong in outline to approaching corymbiform: spikelets fusiform and sterile, or ovoid, acute and fertile, 1-flowered, 3 mm. long: scales acute to aristulate, drab-chestnut: bristles 1–2, rudimentary: achene broadly obovoid, with a pale central disc, smooth or faintly cancellate, 0.9–1.1 mm. wide, 1.2 mm. long: tubercle subulate, 0.4 mm. long, with a broad base. PLATE 822, FIGS. 1A and 1B; MAP 20.—C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 85 (1871) and Fl. Cub. 180 (1873), as "*brachychata*"; Britton, Trans. N. Y. Acad. xi. 90 (1892), in part. *R. pallida* sensu Clarke in Urban, Symb. Ant. ii. 126 (1900), in part, non M. A. Curtis; sensu Kükenthal, Fedde, Rep. Spec. Nov. xxiii. 209 (1926), in part, non M. A. Curtis. *R. Chapmanii* sensu Britton, Mem. Soc. Cubana Hist. Nat. ii. 194 (1916), non M. A. Curtis. *R. Blauneri* Britton, Bull. Torr. Bot. Cl. l. 56 (1923). *Phaeocephalum brachychaetum* House, Am. Midland Nat. vi. 201 (1920).—Fresh-water shallows of western Cuba, Dominican Republic and eastern Puerto Rico. CUBA: in occasionally flooded places in pinelands south of railroad, Herradura, Pinar del Rio, *Ekman*, no. 17737 (G); "en sabanas bajas y a arillas de lagunas, jurisdiccion de Pinar del Rio,"[1] *Wright*, no. 3782 (G, TYPE; NY, US, probable ISOTYPES). HISPANIOLA: hard soil, shallow water, Laguna Ahoga-los-perros, Sabana Guabatico, prov. Santo Domingo, Llano Costero, Dominican Republic, *Ekman*, no. 13309 (US). PUERTO RICO: Sierra Luquillo, *Blauner*, no. 247 (NY, type of *R. Blauneri* Britton).

In his list of North American Rhynchospora, published in 1892, Britton recognized *R. brachychaeta* C. Wright, attributing it to Sauvalle. However, that Britton's conception of this species was at best uncertain is seen in his synonyms "*R. gracillima* Sauv." and "*R. fascicularis* var. *stenophylla* Chapm. mss." *R. gracillima* Wright in Sauvalle, I am recognizing under its

[1] Wright in Sauvalle, Fl. Cub. 181 (1873).

legitimate name, *R. Wrightiana* Boeckl.; *R. fascicularis* var. *stenophylla* was later authentically published by Chapman as *R. stenophylla* and has been maintained as such. Keeping this confusion of 3 species in mind, one is not surprised to find that Britton, in 1916, revised his earlier opinion, this time referring *R. brachychaeta* to *R. Chapmanii* Curtis.

Superficially *R. brachychaeta* and *R. Chapmanii* have much in common. The former is readily distinguished, however, by its acute, not long-aristate, spikelets, and its inflorescence consisting of 1–3 remote narrowly elliptic fascicles in contrast to the single terminal corymbs of *R. Chapmanii.* Close observation by means of a lens enables one to distinguish the two species on a basis of their achenes as well. The achene of *R. brachychaeta* is obovate, dull, with a pale central disc, with a subulate tubercle and with rudimentary bristles. The achene of *R. Chapmanii,* on the contrary, is subelliptic, the disc so enlarged as to cover the entire surface with the exception of a small dark patch at the base and the apex. The surface is glossy, the tubercle deltoid-apiculate, and the bristles are lacking. Clarke, on the other hand, lists *R. brachychaeta* in the synonymy of *R. pallida* M. A. Curtis; but Blauner no. 247 bears Clark's annotation "*Rynchospora divergens* Curtis!"

In 1922, Britton, studying the same specimen, Blauner no. 247, realized that it was a good species wrongly annotated by Clarke; but, failing to see its connection with Wright's *R. brachychaeta,* set it up as a new species, *R. Blauneri.*

The confusion of *R. brachychaeta* with *R. pallida,* initiated by Clarke, was furthered by Kükenthal who, in 1926, assigned Wright, nos. 3782 and 3397 to the latter species. No. 3397 at the Gray Herbarium is a mixed sheet, containing on the left a specimen of *R. fascicularis* (Michx.) Vahl, and it suggests the possibility that the sheets seen by Kükenthal are also mixed. However, even if this were so, it is quite improbable that the specimens of either sheet are *R. pallida,* since this species, unmistakable in its larger achene, pale corymb and tuberous bases, has not been reported south of the Carolinas.

I have corrected the original spelling of this name, following the precedent of authors since Wright.

17. R. PALLIDA M. A. Curtis. Caespitose with short stolons; base bulbous, sheathed by fibrous, acute, ovate scales: leaves long, narrowly linear, 1–3 mm. wide, erect, flat with the exception of the triquetrous tip; upper margins upwardly scabrous: culms acutely trigonous, slender, flexuous, 4.4–9.4 dm. tall, upper angles sparingly serrulate: inflorescence a single turbinate to hemispherical fascicle, 1.4–2.6 cm. wide: spikelets ovoid-attenuate, 4.5–5 mm. long, sessile, 1-flowered: scales forced apart by the developing achene, with aristate tips 0.3–0.4 mm. long, silvery, pale to reddish: stamens 2: bristles obsolete or 1–3 rudimentary stubs 0.2 mm. long: achene obovate to broadly elliptic in outline, strongly lenticular, the surface finely striate, the umbo light and the marginal regions chestnut-brown, 1.2–1.5 mm. wide, 1.4–1.8 mm. long: tubercle compressed, deltoid-apiculate, 0.2–0.4 mm. high. PLATE 821, FIGS. 4A and 4B; MAP 18.—Am. Journ. Sci. ser. 2. vii. 409 (1849), non (Nees) Steud.; Chapman, Fl. So. U. S. 527 (1860); Gray, Man. ed. 5: 568 (1867); Britton & Brown, Ill. Fl. i. 277, fig. 649 (1896); Britton, Man. 184 (1901); Small, Fl. 194 (1903) and Man. 179 (1933); Robinson & Fernald in Gray, Man. ed. 7: 200, fig. 322 (1908); Fernald, RHODORA, xlii. 378, map 14, and 381 (1940). *R. Curtisii* Steudel, Cyp. 141 (1855); Boeckeler, Linnaea, xxxvii. 564 (1873); non Britton ex Small. *Phaeocephalum pallidum* House, Am. Midland Nat. vi. 202 (1920).—Open bogs and wet depressions, often in pineland, Long Island, New York, south through North Carolina. NEW YORK: pine-barren swamp, Central Islip, Suffolk Co., *Ferguson*, no. 515 (G, NY). NEW JERSEY: near P. R. R. 1½ miles northwest of Allaire, Monmouth Co., *Van Pelt & Brown*, no. 244 (P); Lawrence Station, Mercer Co., Aug. 6, 1885, *Peters* (P); growing in dense tufts, Tom's River, Ocean Co., *Parker* (G); sandy peaty edge of cedar swamp, Roberts Branch, Batsto River, Hampton Gate, Burlington Co., *Fogg*, no. 4795 (CU, NY, P); swamp near Merchantville, Camden Co., Sept. 9, 1866, *Parker* (G, P); Woodbury, Gloucester Co., *Herb. C. E. Smith* (P); Mays Landing, Atlantic Co., *Pennell*, no. 8166 (NY); northwest along Port Norris Trolley, Dividing Creek, Cumberland Co., *Long*, no. 4835 (P); boggy meadow, Swain, Cape May Co., Aug. 8, 1925, *Stone* (G). DELAWARE: pine-barren bogs near Laurel, Sussex Co., Aug. 19, 1880, *Commons* (NY, P). MARYLAND: swamps, Eastern Shore, near Salisbury, Wicomico Co., Sept., *Canby* (US). VIRGINIA: sphagnous savanna-like swale east of Cherry Grove, south of South Quay, Nansemond Co., *Fernald & Long*, no. 10550 (CU, G, P, NY). NORTH CAROLINA: wet depression, pineland, beside railroad, 1 mile east of Bailey, Nash Co., *Oosting*, no. 1677 (CU); damp or peaty sandy soil, 3 miles west of Sims, Wilson Co., *Wiegand & Manning*, no. 613 (G); savanna 8 miles southwest of Washington, Beaufort Co.,

Godfrey, no. 4393 (G); wet soil, open pinelands, Newport, Carteret Co., *Randolph & Randolph*, no. 925 (G); moist sandy soil, Fayetteville, Cumberland Co., Biltmore Herb., no. 4472c (US); low pineland, 15 miles north of Laurenburg, Scotland Co., *Godfrey*, no. 5055 (G); wet sandy soil, north side, White Lake, Bladen Co., *Blomquist*, no. 10862 (D); Burgaw, Pender Co., Aug. 1879, *Hyams* (US); low grounds near Wilmington, New Hanover Co., *Biltmore Herb.*, no. 4472 (NC).

18. R. **nuda,** sp. nov. Planta caespitosa: foliis filiformibus vel 1.5 mm. latis, planis, saepissime laevibus, laxe ascendentibus: culmis subtriquetris gracilibus ascendentibus, apicem versus flexilibus vel laxis, 3–4.3 dm. altis: fasciculo solitario, compacto subhemisphaerico vel turbinato, 0.5–1 cm. lato: bracteis setaceis quam fasciculo paullo longioribus: spiculis fertilibus lanceo-ovoideis 4 mm. longis: spiculis sterilibus fusiformibus et numerosis, confertis ascendentibus sessilibus: squamis dense imbricatis, pallidis; mucrone prominente 0.4 mm. longo: setis nullis vel rare 1 rudimentaria antrorse serrulata: achaenio obovoideo lenticulari leviter biconvexo 1.2–1.3 mm. lato 1.5 mm. longo, laevi pallido opaco: tuberculo compresso-deltoideo, apiculato 0.4 mm. alto. PLATE 821, FIGS. 1A and 1B; MAP 23.—Moist sand, Isle of Pines. CUBA: moist white sand, vicinity of Los Indios, Isle of Pines, Feb. 13, 1916, *Britton, Britton & Wilson*, no. 15809 (NY, TYPE) and no. 14177 (NY); in a wet palm grove of *Colpothrinax Wrightii*, between Nueva Gerona and McKinley, Isle of Pines, Feb. 23, 1939, *León, Victorin & Carabia*, no. 18770 (CU); sandy savanna between Nueva Gerona and McKinley, Isle of Pines, Feb. 23, 1939, *León, Victorin & Carabia*, no. 18757 (CU, in part).

This West Indian species is known to me only from three specimens collected on the Isle of Pines. It is similar to *R. Chapmanii* M. A. Curtis both in the slender habit and details of the inflorescence—the numerous fusiform sterile spikelets, strongly awned scales, ovoid, lenticular, bristleless achenes. It differs from the latter in having stiffly erect, not circinate bracts and larger fertile spikelets which are not forced open by the growing achene and which are few in number so that the resultant fascicles are smaller and less corymbiform than those of *R. Chapmanii*.

R. nuda also differs from *R. Chapmanii* in details of the achene. That of the latter measures 0.8–1 mm. wide, 1–1.2 mm. long, is typically lustrous, pale, with dark brown patch at the base and apex. The achene of the Cuban species, on the other hand, is 1.2–1.3 mm. wide, 1.5 mm. long, with a uniformly pale dull surface.

The only close relative of *R. nuda* on the islands is *R. brachychaeta* Wright. However, the terminal fascicles of the latter, although similarly characterized by sterile fusiform spikelets, are occasionally accompanied by 1 or 2 smaller lateral fascicles. Moreover, the scales of *R. brachychaeta* are acute, or, at the most, aristulate, in contrast with the strongly aristate scales of *R. nuda;* and the achenes of the former are smaller (0.9–1.1 mm. wide, 1.2 mm. long), dark brown relieved by a large pale disc and usually accompanied by 1–2 rudimentary bristles.

The specific name has been chosen with reference to the almost complete failure of the bristles, an uncommon condition in the Section *Eurhynchospora.*

19. R. Chapmanii M. A. Curtis. Densely caespitose: leaves capillary to 1 mm. wide, flat, becoming involute on drying; upper margins finely serrulate: culms obtusely trigonous, slender, wiry, erect, smooth, 3–5.1 dm. high: inflorescence a single terminal corymbiform fascicle, 0.5–1.7 cm. wide, closely compacted, less often slightly exceeded by a smaller secondary fascicle: bracts several, filiform, exceeding the fascicles, erect or slightly circinate: fertile spikelets slenderly ovoid-aristate, mostly ascending, closely approximate, 1-flowered, split apart by the maturing achene, 2.5–3 mm. long; sterile spikelets fusiform: scales with aristate tips 0.4–0.6 mm. long, pale chestnut-brown: stamens 1–2: bristles none: achene subelliptic in outline, strongly lenticular, 0.8–1 mm. wide, 1–1.2 mm. long, pale except for the dark brown patch at base and apex; surface obscurely rugulose to smooth, glossy: tubercle deltoid-apiculate with a broad base, compressed, 0.2–0.3 mm. high. Plate 821, figs. 3A and 3B; Map 19.—Am. Journ. Sci. ser. 2. vii. 409 (1849); Chapman, Fl. So. U. S. 528 (1860); Small, Fl. 194 (1903) and Man. 179 (1933). *R. conferta* Chapman ex M. A. Curtis, Am. Journ. Sci. ser. 2. vii. 409 (1849), in syn. of *R. Chapmanii. R. Grayana* Chapman ex M. A. Curtis, Am. Journ. Sci. ser. 2. vii. 409 (1849), pub. in syn. of *R. Chapmanii. Phaeocephalum Chapmanii* House, Am. Midland Nat. vi. 201 (1920).—Low, sandy pineland of the Coastal Plain of North Carolina to Florida and west to eastern Louisiana. North Carolina: wet sandy soil, waste ground, Beaufort, Carteret Co., *Randolph & Randolph,* no. 795 (G); savanna, 8 miles south of Jacksonville, Onslow Co., *Godfrey,* no. 6472 (G); 7 miles southwest of Wilmington, Brunswick Co., *Godfrey,* no. 6220 (G); moist place, Pireway, Columbus Co., *Schallert,* no. 3973 (US); low pineland near White Lake, Bladen Co., *Blomquist,* no. 5617 (D); pineland at Delway, Sampson Co., *Godfrey,* no. 6170 (D, G); low pineland at Dunn, Harnett Co., *Godfrey,*

no. 6139 (D, G). South Carolina: grass-sedge bog or savanna, 18 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 1609 (D, G, NY); damp pine levee, Santee Canal, Berkeley Co., *Ravenel*, no. 25 (G); grass-sedge bog or savanna 14 miles south of Monks Corner, Berkeley Co., *Godfrey & Tryon*, no. 1432 (G, NY); pineland pool, 5 miles south of Hardeeville, Beaufort Co., *Eyles*, no. 4378 (CU). Georgia: moist pine barren near Monteith, Chatham Co., *Eyles*, no. 6455 (CU); sandy borders of pine-barren stream, Fitzgerald, Ben Hill Co., *Harper*, no. 1420 (G, NY, US); moist pine barrens, Sweetwater Creek, Clinch Co., *Eyles*, no. 244 (D). Florida: moist pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 5015 (G, NY, US); Tocai, St. Johns Co., *Palmer*, no. 605 (G); Tampa, Hillsborough Co., Oct., 1877, *Garber* (G, P); prairie, 18 miles east of Okeechobee City, St. Lucie Co., *Small et al.*, no. 9300 (NY); edge of dried-up pool in low pineland, vicinity of Eustis, Lake Co., *Nash*, no. 1396 (NY); turfy, boggy, sandy meadow, 7 miles west of Sneads, Jackson Co., *Wiegand & Manning*, no. 589 (G); sloping moist pine barrens about 5 miles south of Bristol, Liberty Co., *Harper*, no. 47 (G, NY, P); flat pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 201a (G, NY, US); low open places, Lynn Haven, Bay Co., Oct. 12, 1921, *Billington* (US). Alabama: low pineland about Miflin Creek, Elberta, Baldwin Co., July 9, 1926, *Wolf* (StB); sandy pineland, Theodore, Mobile Co., *Pennell*, no. 4446 (NY). Mississippi: Ocean Springs, Jackson Co., *Seymour*, no. 15 (CU, D, NY, US); Biloxi, Harrison Co., *Tracy*, no. 4888 (US). Louisiana: open pineland, 1 mile north of Abita Springs, St. Tammany Parish, *Pennell*, no. 4167 (NY).

Series 4. **Fuscae** (Clarke), stat. nov. et emend. Represented in the peat bogs of the northeast by the common *R. fusca*, also infrequent species in low places and pond-margins of the Coastal Plain and Cuba. Habit solitary to caespitose: leaves filiform to 2 mm. wide: culms filiform to slender: inflorescence 2–4 turbinate to hemispherical fascicles: spikelets maturing several achenes: scales loosely imbricate, castaneous to fuscous: bristles upwardly serrulate, well developed: achenes pyriform, slenderly elliptic, often strongly biconvex, smooth to glossy (minutely granular in *R. fuscoides*): tubercle triangular, compressed, thickly setose.—*Rhynchospora* Series B. *Diplostyleae* Sect. 4. *Fuscae* Clarke in Urban, Symb. Ant. ii. 105 (1900), in part. *Rhynchospora* V. *Glomeratae* Small, Man. 175 (1933), in small part.

Key to Species in Series Fuscae

a. Fascicles 1–3, turbinate or ovoid, the relatively few spikelets strongly ascending; leaves filiform to 1.5 mm. wide, erect....*b.*

b. Slenderly stoloniferous; fascicles exceeded by 1–2 long bracts; bristles naked at their bases.....20. *R. fusca.*

b. Caespitose; bracts shorter than or barely exceeding the fascicles; bristles sparsely hairy at their bases....*c.*
c. Achenes plumply ovoid, homogeneously brown, 1–1.1 mm. long.....21. *R. pleiantha.*
c. Achenes slenderly elliptic, with a pale oval disc, 1.3–1.5 mm. long.....22. *R. Curtissii.*
a. Fascicles corymbose to hemispherical, composed of many erect to divaricate spikelets, or, if fascicles more or less turbinate, then 4–5 in number, with many spikelets and the leaves 2 mm. wide or wider and languidly ascending....*d.*
d. Corymbs 2, rarely 3, the terminal internode strongly arched; bracts foliaceous.....23. *R. Harperi*
d. Corymbs 2–5, the terminal internode erect or flexuous; bracts setaceous....*e.*
e. Achenes borne on a persistent basal stipe which is 6 mm. in length and covered with a tangle of white hairs; habit weak; leaves 2 mm. wide or wider; corymbs 4–5 .....24. *R. crinipes.*
e. Achene without a conspicuous basal stipe; stipe, if, present, not hairy; habit wiry, erect; leaves filiform to 1.5 mm. wide; corymbs 2–4....*f.*
f. Surface of achenes glassy, with a white lustrous disc; leaves filiform, rarely 2 mm. wide; Coastal Plain, and western and central Cuba.....25. *R. filifolia.*
f. Surface of achene tending to become granular or somewhat polished, cinnamon-brown with a paler central disc; leaves 1–1.5 mm. wide; range limited to western Cuba.....26. *R. fuscoides.*

20. R. FUSCA (L.) Ait. f. Slenderly stoloniferous: leaves promptly involute, filiform to 1.5 mm. wide, ascending: culms slender, erect, terete, 0.8–4.6 dm. high: terminal fascicle often compounded of 2–3 closely approximated secondary fascicles, turbinate or ovoid, 0.3–2 cm, wide, exceeded by the 1 or 2 long circinate or erect bracts; lateral fascicles 1–2, on exserted peduncles: spikelets narrowly ellipsoid, 2–3-flowered, 2–3-fruited, loose, sessile, strongly ascending, 4–6 mm. long: scales aristate, castaneous, sometimes blackened: bristles 5–6, 3 always as long as or longer than the tubercle, 2–3 often shorter than the achene, delicate, tenuous, upwardly serrulate, sinuously ascending: achene pyriform, lenticular but plump, obscurely marginate, smooth, lustrous, light brown, occasionally marked with a faint reticulate pattern, 1–1.1 mm. wide, 1.2–1.3 mm. long: tubercle attenuate-subulate, usually greenish; the lower margins conspicuously serrulate. PLATE 824, FIGS. 2A and 2B; MAP 24.—Hort. Kew. ed. 2: i. 127 (1810); Gray, Ann. Lyc. N. Y. iii. 215, pl. 6, fig. 26 (1835); Torrey, Ann. Lyc. N. Y. iii. 366 (1836); Britton & Brown, Ill. Fl. i. 279, fig. 656 (1896); Britton, Man. 185 (1901); Small, Fl. 1321 (1903) and Man. 181 (1933); Robinson & Fernald in Gray, Man. ed. 7: 200, fig. 319 (1908); Victorin, Fl. Laurent. 689, fig. 248 (1935). *Schoenus fuscus* Linnaeus, Sp. Pl. ed. 2: ii. 1664 (1763). *R. alba* β. *fusca* Vahl, Enum. ii. 236 (1806). *Phaeocephalum fuscum* House, Am. Midland Nat. vi. 202 (1920).

—Peat bogs and sandy or peaty pond-shores, Newfoundland, eastern New Brunswick, Nova Scotia and southern portions of Maine, New Hampshire and Vermont; general over the other New England states; southward along the coast to Maryland; inland in central New York State with scattered stations on the shores of Lakes Superior, Michigan and Huron; also in Europe. The characters of *R. fusca* are sufficiently distinct to make the citation of representative specimens unnecessary.

21. R. **pleiantha** (Kük.), stat. nov. Caespitose: leaves filiform to 1 mm. wide, flat, setaceous, ascending: culms obtusely trigonous, filiform to slender, erect, exceeding the radical leaves, 2.5–4 dm. tall: terminal fascicle corymbiform, composed of not more than 15 spikelets; lateral fascicles 1–2, smaller, on exserted erect peduncles: spikelets oblong-ovate, sessile, erect to spreading, approximately 6-flowered, 2-fruited, 6 mm. in length: fertile scales lanceolate-aristate, loosely imbricate, greatly exceeding the achene in length: bristles 6, variable, the tallest barely exceeding to twice the height of the tubercle, upwardly serrulate, with a few short white hairs at their bases: achene ovate, lenticular, biconvex, with depressed margins, 0.7–0.8 mm. wide, 1–1.1 mm. long; surface smooth, dark shining brown at maturity, with an indefinite paler disc: tubercle triangular, attenuate, flat, pale; margins sparingly serrulate or smooth, 0.6–0.8 mm. long. PLATE 823, FIGS. 4A and 4B; MAP 25.—*R. filifolia* Torrey var. *pleiantha* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 208 (1926). *R. fusca* sensu Harper, Bull. Torr. Bot. Cl. xxx. 324 (1903), non (L.) Ait. f.—Infrequent, shores of ponds and lakes in southeastern North Carolina, southwestern Georgia, central Florida, and western Cuba. NORTH CAROLINA: shore of Silver Lake near Wilmington, New Hanover Co., July 5, 1938, *Godfrey*, no. 4846 (G); shallow pond near Carolina Beach, New Hanover Co., July 2, 1938, *Godfrey*, no. 4827 (G); moist sandy soil, Orton, Brunswick Co., Aug. 18, 1930, *Blomquist* (D.) GEORGIA: margin of pine-barren pond near Rift, Lee Co., July 13, 1901, *Harper*, no. 1067 (G, NY). FLORIDA: sandy shore of Lake Juana, Eustis, Lake Co., July 16–31, 1894, *Nash*, no. 1321 (G, NY, P, US). CUBA: on moist white sand on shore of the laguna, Laguna Santa Maria, Pinar del Rio, Aug. 22, 1923, *Ekman*, no. 17242a (NY, US, immature. This number cited by Kükenthal in original description of var. *pleiantha*) and no. 17242b (G. This number cited by Kükenthal in original description of var. *pleiantha*.).

Specimens of *R. pleiantha* have generally been identified as either *R. Curtissii* Britt. ex Small or *R. fusca* (L.) Ait. f. The confusion with *R. Curtissii* obviously results from a similarity in habit, but the most superficial examination of the achenes enables one to separate these species. Those of *R. pleiantha* are

pyriform, dark brown, not exceeding 1 mm. in length; those of *R. Curtissii*, on the other hand, are narrowly ellipsoidal, 1.3–1.5 mm. long and light brown, with a pale conspicuous oval disc.

The confusion of *R. pleiantha* with *R. fusca*, however, is due to a likeness which extends to details, not only of the habit and spikelet, but to the achene as well. Nevertheless, specimens of *R. pleiantha* can rather easily be separated from those of *R. fusca*, for the fascicles of the latter are exceeded by a long setaceous bract which is often circinate at its tip; whereas those of the southern species are subtended by a short stiff bract which is at the most only twice the height of its facsicle.

The specific distinction of the one from the other species rests, however, on the more technical differences of the achene. That of *R. pleiantha* is 0.7–0.8 mm. wide and 1 mm. long; in color it is a dark mahogany-brown, and the bristles are sparsely plumose at their bases. The achene of *R. fusca*, by contrast, is larger, 1–1.1 mm. wide and 1.2–1.3 mm. long, consistently light brown in color, with the bases of the bristles naked.

23. R. Curtissii Britt. ex Small. Caespitose: leaves filiform to 1 mm. wide, wiry, involute with the exception of the flattened tip 0.6–1.4 mm. long: culms filiform, loosely ascending, 1.5–3 dm. high: fascicles 1–2, turbinate, 4–8 mm. wide, composed of less than 10 spikelets; lateral fascicle borne on an included peduncle: spikelets ovoid-elliptic to fusiform, similar to those of *R. fusca*, 2–3-flowered, 2–3-fruited, strongly ascending, 4–6 mm. long: scales mucronulate, ovate-oblong, rather loose, castaneous: bristles 6, erect, delicate, tenuous, scarcely equalling to well exceeding the tubercle, antrorsely hispidulous, sparingly plumose at the base: achene narrowly ellipsoid, lenticular, smooth, often lustrous, light brown, with a pale elliptic disc, marginate, 0.6–0.7 mm. wide, 1.3–1.5 mm. long: tubercle deltoid, sometimes subulate, compressed, with conspicuous upward serrulations, 0.8–1.2 mm. long. Plate 823, figs. 3A and 3B, Map 26.—Fl. 195, 1327 (1903) and Man. 181 (1933). *R. fusca* sensu Fernald, Bot. Gaz. xxiv. 433 (1897), non (L.) Ait. f. *Phaeocephalum Curtissii* House, Am. Midland Nat. vi. 201 (1920).—Low places, coastal counties of Northwestern Florida, Alabama, and Mississippi. Florida: moist roadside, Milton, Santa Rosa Co., *Curtiss*, no. 5929 (NY, type; G, NC, US, isotypes); moist pine barrens about 1½ miles northeast of Milton, Santa Rosa Co., *Harper*, no. 46 (G, NY, US). Alabama: swamp, Elberta, Baldwin Co., Aug. 21, 1926, *Wolf* (StB, in part *R. filifolia* Gray in Torr.). Mississippi: Ocean Springs, Jackson Co., *Tracy*, no. 4891 (G, NC, NY, US).

23. R. Harperi Small. Solitary: radical leaves filiform, few, short; cauline leaves 1–1.5 mm. wide, long-attenuate, erect, canaliculate, smooth: culm obtusely trigonous, slender, 6–7.3 dm. tall; the terminal internode strongly arched: fascicles 1–2, rarely 3, corymbiform, 1.1–1.5 cm. wide, separated by the arching internode; occasionally a third fascicle distant and smaller: bracts foliaceous: spikelets ovoid, loosely imbricate, 5-flowered, 4-fruited, 5–5.6 mm. long: scales aristulate, margins free, castaneous: bristles 6, slender, upwardly hispidulous, falling short of the tubercle: achene obovate to pyriform, strongly umbonate, brown, with a slightly paler disc, smooth, 1–1.1 mm. wide, 1.3–1.4 mm. long: tubercle subulate, pale, 0.6–0.9 mm. high, its margins thickly hispidulous. Plate 823, figs. 1A and 1B; Map 27.—Man. 182, 1503 (1933). *R. leptorhyncha* sensu Small, Fl. 195 (1903), non *R. leptorhyncha* C. Wright.—Infrequent on borders of ponds and in low places in the pine barrens of the Coastal Plain of Georgia, Florida, and Alabama. Georgia: edge of pond, just north of Ludowici, Long Co., *Eyles*, no. 6527 (CU); wet pine barrens about 3 miles east of Hawkinsville, Pulaski Co., *Harper*, no. 1377 (NY, type; US, isotype); wet pine barrens, Sumter Co., *Harper*, no. 467 (G, US). Florida: Tampa, Hillsborough Co., May, 1876, *Garber* (NY, US). Alabama: border of pond, Elberta, Baldwin Co., July 15, 1926, *Wolf* (StB).

Prior to 1933, *R. Harperi* was identified as *R. leptorhyncha* Wright, the type-specimen of *R. Harperi* being originally so determined by Britton. However, the two species can be readily distinguished from one another. Of the two, *R. leptorhyncha* has the much stiffer habit, an inflorescence exceeded by a tall upright bract, and tightly involute floral scales. *R. Harperi*, on the contrary, has the culm arched to nodding, a short bract subtending the fascicle, and loose floral scales. Nor is there any close resemblance in the achenes. Those of *R. leptorhyncha* are of the *fascicularis*-type—large, dark, dull, and broadly ovate. The achenes of *R. Harperi*, on the other hand, are pyriform, light brown, resembling, but surpassing in size, those of *R. filifolia* Gray.

24. R. **crinipes,** sp. nov. Planta caespitosa: foliis 2 mm. latis planis lineari-elongatis, debilibus, apicem versus triquetris et sparse serrulatis: culmis gracilibus subtriquetris, 6.9–7.4 dm. altis, laxe ascendentibus: fasciculis 4–5 compactis 1–2 cm. latis turbinatis lobatisque vel corymbosis; pedunculis fasciculorum lateralium subexsertis: bracteis setaceis parvis ornatis: spiculis lanceolatis 5 mm. longis confertis, ascendentibus vel patentibus

3-floris sed quarto terminali rudimentario, 2-carpis: squamis lanceolatis, aristulatis, laxe imbricatis, mox caducis chartaceis pallide castaneis: setis 6 rigide erectis, tuberculo approximate aequalibus: achaenio pyriformi 1.4 mm. longo 1 mm. lato, biconvexo laevi, marginem versus leviter depresso; umbone candido, conspicuo; stipa tereti persistente 6 mm. longa villis longis albis irregularibus ascendentibus vestita: tuberculo compresso-triangulo 0.8 mm. alto, margine hispido-scabrato. Plate 823, figs. 2A and 2B; Map 28.—Coastal Alabama. Alabama: dry places, roadsides (exsiccated), Mobile, Mobile Co., June, 1868, *Mohr* (US); ditches, border of ponds, Mobile, Mobile Co., June 18, 1868, *Mohr* (US, type).

This species, represented by two specimens collected by Mohr in the vicinity of Mobile, Alabama, is closely related to *R. filifolia* Gray. It differs from the latter in its generally larger habit with wider leaves, coarser culms, and in its languid habit and looser, more numerous and more irregular fascicles. Both species have, however, the pyriform achene, with its glossy surface picked out by a prominent pale disc, the six stiffly erect bristles and the deltoid, compressed and marginally hispid tubercle. The signal character which distinguishes *R. crinipes* from *R. filifolia* is the unique basal stipe of the former, which is 0.6 mm. long, remains attached to the achene, and is clothed with a tangle of white, ascending hairs.

25. R. filifolia Gray. Densely caespitose: basal leaves filiform, flexuous; cauline leaves filiform to rarely 2 mm. wide, flat, upper margins minutely serrulate: culms terete, slender, typically flexuous, 3.3–6.5 dm. high: fascicles 2–3, turbinate to corymbiform, 0.9–1.5 mm. wide; terminal fascicle at least twice exceeded by a wiry undulant bract: spikelets long-ovoid, 3–4 mm. long, closely approximate, 3–6-flowered, maturing 1–4 achenes: scales mucronulate, ferruginous, loose, caducous so that at maturity the lower part of the rachis is exposed: bristles 6, upwardly serrulate, stiffly erect, equalling to slightly overtopping the tubercle: achene pyriform, 0.6–0.8 mm. wide, 0.9–1 mm. long, lenticular, biconvex, marginate, caducous, the face glassy with a white lustrous disc: tubercle deltoid-compressed, 0.4–0.6 mm. high, pale, with the margin hispid-scabrous. Plate 822, figs. 3A and 3B; Map 35.—Gray in Torrey, Ann. Lyc. N. Y. iii. 366 (1836); Chapman, Fl. So. U. S. 527 (1860); Britton, Mem. Soc. Cubana Hist. Nat. ii. 195 (1916); Small, Fl. 195 (1903) and Man. 181 (1933). *Phaeocephalum filifolium* House, Am. Midland Nat. vi. 202 (1920).—Margins of ponds or damp pockets in pinelands on the Coastal Plain of New Jersey, south to Florida, and west

to eastern Texas; also in central and eastern Cuba. NEW JERSEY: sandy and peaty pond-hole ca. 1 mile west of Bennett, Cape May Co., *Long*, no. 13625 (G). DELAWARE: Queen Anne Road, east of Ellendale, Sussex Co., Aug. 17, 1899, *Commons* (P). VIRGINIA: upper border of siliceous and argillaceous shore, Airfield Mill-pond, southwest of Wakefield, Sussex Co., *Fernald & Long*, no. 14301 (G). NORTH CAROLINA: *Mr. Curtis*, in Gray's handwriting (NY, TYPE); moist savannah between Newport and New Bern Highway, no. 70, Craven Co., *Blomquist*, no. 11241 (D, G); moist sandy soil between Morehead City and Newport, Highway no. 70, Carteret Co., *Blomquist*, no. 11238 (D, G); wet sand, 7 miles southwest of Wilmington, Brunswick Co., *Godfrey & Shunk*, no. 4117 (G, NC). SOUTH CAROLINA: grass-sedge bog or savanna, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 749 (CU, D, G, NY, P); damp soils, Oct., *Ravenel* (G). GEORGIA: margin of cypress pond, north of Douglas, Coffee Co., *Harper*, no. 1434 (G, US); pineland pool just east of the Clinch Co. line on U. S. Route 84, Ware Co., *Eyles*, no. 6328 (CU). FLORIDA: moist pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 3153 (CU, G, P, US); margin of flatwoods pond, Welaka, Putnam Co., *Laessle*, no. 13 (CU); Indian Mound near Citrus Center, DeSoto Co., *Small*, no. 9918 (NY); cypress swamp, vicinity of Ft. Myers, Lee Co., *Standley*, no. 12865 (US); hammock north of Eagle Bay near Kissimmee River, Okeechobee Co., *Small*, no. 9188 (G); margins of ponds in pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 864b (G, NY, US). ALABAMA: about swamp, Elberta, Baldwin Co., Aug. 24, 1926, *Wolf* (StB); in woods, Spring Hill, Mobile Co., *Langlois*, no. 178 (US). MISSISSIPPI: Ocean Springs, Jackson Co., *Tracy*, no. 4866 (NY, US); Biloxi, Harrison Co., *Tracy*, no. 2926 (NY). LOUISIANA: vicinity of Covington, St. Tammany Parish, *Arsène*, no. 11869 (US); frequent, low prairies, vicinity of Lake Charles, Calcasieu Parish, *Mackenzie*, no. 443 (Mo, NC). TEXAS: ponds, Hempstead, Waller Co., *Hall*, no. 717 (Mo, US). CUBA: in lagoon near El Paynes, between Guane and Remates near sea level, Pinar del Rio, *Killip*, no. 32373 (CU, US); Laguna Los Indios and vicinity, Pinar del Rio, *Shafer*, no. 10819 (NY); Herradura, Pinar del Rio, *Baker & Abarca*, no. 4195 (NY); savanna, Vivijagua, Isle of Pines, *Britton, Britton & Wilson*, no. 15018 (NY); in wet sand, shore of Laguna Yaiti, Mordazo, Santa Clara, *Ekman*, no. 17083 (G); near lagoon, Asiento Viejo, Sabana de Manacas, Santa Clara, *León*, no. 9288 (NY).

26. R. FUSCOIDES Clarke. Caespitose: leaves 1–1.5 mm. wide, involute on drying, stiffly erect: culms obtusely triquetrous, slender, erect, 4.7–7.8 dm. high: fascicles 2–4, the terminal one turbinate to hemispherical, barely if at all exceeded by the sub-

tending bract, 0.9–2 cm. wide; peduncles of the lateral fascicles included or nearly so: spikelets lanceolate in outline, closely approximate, 3–6-flowered, 1–5-fruited, 3.5–5 mm. long: scales aristulate, loosely imbricate, somewhat caducous: bristles 6, approximating the height of the tubercle, stiffly erect, upwardly serrulate: achene pyriform, lenticular, conspicuously marginate, 0.7–0.8 mm. wide, 1.2–1.3 mm. long; the surface tending to become granular, drab to somewhat polished cinnamon-brown, with a paler central disc: tubercle deltoid, subulate, compressed, with the margin thickly setose. Plate 822, figs. 5A and 5B; Map 29.—Clarke in Britton, Trans. N. Y. Acad. Sci. xi. 89 (1892), in part and excl. syn. *R. fascicularis*, var. *distans* Chapm., *nomen nudum;* Clarke in Urban, Symb. Ant. ii. 124 (1900), excl. syn. *R. fascicularis*, var. *distans* Chapm. and *R. fusca* hb. Chapm., first valid publication; Britton, Mem. Soc. Cubana Hist. Nat. ii. 195 (1916). *R. filifolia* sensu Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 180 (1873), non Gray in Torrey. *R. distans* var. *microcarpa* Boeckeler, Flora, lxiv. 78 (1881).—Lagoon-margins and wet pinelands of western Cuba. Cuba: *Wright*, no. 3783 (G, NY, US, isotypes, this number cited by Clarke as type of *R. fuscoides* and by Boeckeler as type of *R. distans* var. *microcarpa*); wet grassy places, pinelands, at 12 km. of highway to La Coloma, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17807 (NY); swale in pinelands, Laguna Santa Maria, Pinar del Rio, *Britton, Britton & Gager*, no. 7137 (NY); border of lagoon, Laguna Santa Maria, Pinar del Rio, *Britton, Britton & Gager*, no. 17179 (NY, US); wet pine woods, Pinar del Rio, Sept., 1863?[1] *Wright*, (NY).

R. fuscoides is closely related to *R. filifolia* Gray, a species of the Coastal Plain which also occurs in Cuba. *R. fuscoides* can be distinguished in the field, however, by its coarser, stiff unbending habit, its lack of filiform basal leaves, its culms which frequently bear 4 fascicles, and its long spikelets. *R. filifolia* has a delicate habit, with the culms normally flexuous, the basal, and often the cauline leaves as well, filiform and arching, and the fascicles limited to 3. In *R. fuscoides* the terminal fascicle is subtended by a short bract which may slightly exceed the fascicle; in *R. filifolia*, however, the bract is prominent, undulant, and at least twice the height of the fascicle.

Under a lens the tiny achenes of *R. filifolia*, with their glassy surfaces picked out by the lustrous white discs, are unmistakable. Those of *R. fuscoides* are, by contrast, less pyriform in outline,

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905).

longer, with a dull and often granulose drab-brown surface, somewhat relieved by lighter discs.

Boeckeler in 1880 was the first to recognize that the specimens of Wright's no. 3783[1] were not *R. filifolia* as labeled. He set them off, therefore, as var. *microcarpa* of *R. distans* (Michx.) Vahl but added, ". . . Torrey's Pflanze wird durch eine andere schmächtige Form, *Rh. gracilenta* A. Gray, mit der typischen Form der *R. distans* genau verbunden." However, so utterly different in all but the most superficial details are the Wright specimens from *R. distans* and *R. gracilenta* that it is difficult to imagine wherein lay Boeckeler's basis for the suggested relationship.

By 1892 Clarke had evidently studied the Wright material and come to the decision that its status was that of a new species; for in that year Britton included in his list of North American Rhynchospora, *R. fuscoides* Clarke, based on Wright no. 3783. The description of the new species was not published, however, until 1900, when it appeared in Clarke's treatment of the West Indian Cyperaceae for Urban's Symbolae Antillanae ii. Clarke, in giving the synonymy of *R. fuscoides*, lists both *R. distans* var. *microcarpa* Boeckl. and *R. fascicularis* var. *distans* (Michx.) Chapm., probably taking his cue for the inclusion of the latter from Boeckeler's original misalliance.

Series 5. **Fasciculares,** ser. nov. Inflorescentia fasciculata vel cymoso-fasciculata (*R. Gageri* excepta) rigida: squamis castaneis vel furvis: setis antrorse serrulatis rudimentariis vel bene evolutis: achaenio late ovato vel elliptico laevi castaneo vel fusco; saepe disco pallido.

Plants of usually moist areas in pineland and savannas of the Coastal Plain, West Indies and Central America. Habit caespitose: leaves filiform to 4 mm. wide: culms stout and erect to capillary, then occasionally procumbent: cymes usually fasciculate, simple or compound (spiciform in *R. Gageri*), stiff: scales castaneous to blackened: bristles rudimentary to well formed, antrorsely serrulate: achene broadly ovate to elliptic, smooth, castaneous to blackish-brown, often with a prominent pale disc, usually dull: tubercle triangular, compressed, often prolonged.—*Rhynchospora* V. *Glomeratae* Small, Man. 175 (1933), in part.

[1] One of the sheets of Wright's no. 3783 at the New York Herbarium is mixed. The other species is *R. leptorhyncha* Wright in Sauvalle. According to C. B. Clarke (Urban, Symb. Ant. ii. 125 (1900)), this is also true of a sheet of the same number in the herbarium at Kew.

Rhynchospora Series B. *Diplostyleae* Sect. 4. *Fuscae* Clarke in Urban, Symb. Ant. ii. 105 (1900), in part.

KEY TO SPECIES IN SERIES FASCICULARES

a. Terminal cyme ovoid, spiciform, or consisting of 2 corymbiform fascicles aligned one above the other; setaceous bracts long; species endemic to the West Indies....*b.*
b. Terminal cyme composed of 2 secondary corymbiform fascicles aligned one above the other; scales dark brown to blackish; achenes 1.6–1.8 mm. wide, 1.6–1.8 mm. long ..... 27. *R. leptorhyncha.*
b. Terminal cyme spiciform to ovoid, the division into fascicles not distinct; scales castaneous; achenes 1.2–1.6 mm. wide, 1.4–1.7 mm. long....*c.*
c. Cymes spiciform; surface of achene polished; bristles bearing a basal tuft of long white hairs; tubercles subulate-attenuate ..... 28. *R. Gageri.*
c. Cymes ovoid-congested; surface of achene mostly dull; bristles basally hispidulous or with a few short inconspicuous hairs; tubercle deltoid ..... 29. *R. joveroensis.*
a. Terminal cyme fasciculate, corymbiform when well developed; setaceous bracts short, slightly if at all exceeding the cymes; species continental, with a few also represented in the West Indies....*d.*
d. Bristles 12; achene 2–2.5 mm. long ..... 30. *R. Baldwinii.*
d. Bristles 6; achene 1.8 mm. long or less....*e.*
e. Achene minute, 0.8 mm. wide, 0.9–1 mm. high ..... 31. *R. Fernaldii*
e. Achene exceeding 1 mm. in width and 1–2 mm. in length....*f.*
f. Tubercle with a prominent strap- or beak-like prolongation....*g.*
g. Bristles equalling to falling short of the tubercles; tubercle broad-based, gradually tapering toward the apex, 1–2.6 mm. in length ..... 32. *R. gracilenta.*
g. Bristles rarely equalling the achene; tubercle basally triangular but abruptly contracted into a broad blunt beak ..... 33. *R. Wrightiana.*
f. Tubercle deltoid to deltoid-subulate, not prolonged....*h.*
h. Bristles rudimentary to exceeding the achene; culms erect, often coarse ..... 34. *R. fascicularis.*
h. Bristles rudimentary; culms filiform, loosely ascending to procumbent ..... 35. *R. debilis*

27. R. LEPTORHYNCHA C. Wright. Stiffly caespitose: leaves 1–2 mm. wide, erect, numerous, with a long triquetrous tip due to the development of a carina: culms erect, obtusely triangular, 2.2–5.0 dm. high: inflorescence of 2 terminal simple corymbiform fascicles, 0.8–1.1 cm. wide, having not more than 20 spikelets, the one subsessile and subtended by a long setaceous bract, the other raised directly above it on a short erect branchlet; rarely a distant lateral fascicle on a slender erect peduncle present: spikelets ovoid, sessile, ascending to spreading, 2–3-flowered, mostly 1- or occasionally 2-fruited, 5.5–6.5 mm. long: scales prominently aristate, dark brown, often blackened, tightly imbricate: stamens 4: bristles 8, upwardly hispidulous; the tips

connivent around and exceeding the tubercle, plumose at their bases: achene elliptic to suborbicular in outline, strongly biconvex, 1.6–1.8 mm. wide, 1.6–1.8 mm. long; surface smooth, dull brown: tubercle deltoid-subulate, broad-based, nearly smooth to setose, usually pale, 1.4–1.8 mm. high. PLATE 824, FIGS. 1A and 1B; MAP 30.—C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 180 (1873); Clarke in Urban, Symb. Ant. ii. 124 (1900); Britton, Mem. Soc. Cubana Hist. Nat. ii. 195 (1916); Kükenthal, Fedde Rep. Spec. Nov. xxiii. 209 (1926); usually as "leptorrhyncha." *R. leptorhyncha* var. *laevirostris* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 209 (1926). *R. gracilenta* sensu Clarke in Urban, Symb. Ant. ii. 126 (1900), non Gray. *R. tetrandra* C. Wright msc. ex Clarke in Urban, Symb. Ant. ii. 127 (1900), pub. in syn. of *R. gracilenta* sensu Clarke, non Gray. *Phaeocephalum leptorhynchum* House, Am. Midland Nat. vi. 202 (1920).—Near or in shallow water, western Cuba and the Isle of Pines. CUBA: *Wright*, no. 3784 (G, TYPE; NY, US, probable ISOTYPES)[1]; *Wright*, no. 3787 (G. This sheet of the number listed by Wright for *R. odorata* is *R. leptorhyncha*); in ponds, pinales, jurisdiccion Pinar del Rio, Oct., 1862 or 3[2] *Wright* (NY); moist places in pineland savannas to the south of Laguna de Junco, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17869 (NY); in brook between Pinar del Rio and Coloma at 11 kilometers, *Ekman*, no. 18252 (NY, US. Cited by Kükenthal with other Ekman numbers in type-description of *R. leptorhyncha* var. *laevirostris*); in pebbly pinelands, La Siguanea, Isla de Pinos, *Ekman*, no. 12187 (NY).

Specimens in the Wright collection without number but labeled *R. tetrandra* are undoubted *R. leptorhyncha*. The fact that Wright never published a species *tetrandra* suggests that he also realized this fact.[3]

C. B. Clarke in Urban's Symbolae Antillanae, ii. page 127, erroneously refers *R. tetrandra* to *R. gracilenta* Gray. On a basis of this misidentification, Britton[4], in his publication on Cuban Rhynchospora provisionally lists *R. gracilenta*, but states that the Wright material of *R. tetrandra* in the Herbarium of the New York Botanic Garden is *R. leptorhyncha*.

I am not keeping up Kükenthal's var. *laevirostris*. As the name indicates this variety is based on specimens, the achenes

[1] No. 3784 is also listed by Wright under *R. gracilis*. There is one sheet of this no labeled "*Rh. gracilis*" in the Gray Herbarium.

[2] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905).

[3] Also one Gray Herbarium sheet, C. Wright, no. 3787, labeled *R. odorata* is *R. leptorhyncha*.

[4] Mem. Soc. Cubana Hist. Nat. ii. 196 (1916).

of which have a smooth, rather than setose, tubercle. However, even in the specimens of sheets cited by Kükenthal, I find this character to be inconstant; for individual achenes from the same inflorescence vary considerably, some having nearly smooth, others rather densely setose tubercles.

28. R. Gageri Britt. Densely caespitose with thick, often fibrous bases: leaves setaceous, canaliculate, firm, arched-ascending, 1.8–3.3 dm. high: culms filiform, terete, ascending or somewhat arched, varying within a tuft from 0.5–2.2 dm. in height: terminal cyme fasciculate, compact, ovoid, small (0.9–1.2 mm. long, 0.6–1 cm. wide) rarely containing more than 15 spikelets, exceeded by a setaceous, recurving bract 0.4–1.3 dm. long which has the appearance of continuation of the culm: spikelets ovoid, crowded, 1-flowered with the achene terminating the axis, sessile, mostly ascending, closely approximate, 3–4 mm. long: scales aristulate, tightly imbricate, castaneous: stamens 3–4: bristles 6–8, delicate, upwardly serrulate, connivent around the tubercle which they fall short of to slightly exceed, bearing at their bases a few silky hairs which are 0.6 mm. in length: achene broadly ovoid, strongly biconvex, not umbonate, surface evenly browned, smooth, occasionally lustrous, 1.3–1.6 mm. wide, 1.4–1.7 mm. long: tubercle subulate-attenuate, compressed, smooth or rarely slightly setulose at the base, whitish, 0.9–1.1 mm. long. Plate 824, figs. 3A and 3B; Map 31.—Mem. Soc. Cubana Hist. Nat. ii. 196 (1916). *R. longifrons* var. β. *reducta* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 209 (1926).—-Moist savannas, Isle of Pines; western and central Cuba. Cuba: in white sand of Sabana de los Indios, Isle of Pines, *León*, no. 17501 (G); Hacienda San Julian, south of Mendoza, Pinar del Rio, *León & Roca*, no. 6955 (NY); in moist places, Mateo Sanchez, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17939 (G, US. This number cited by Kükenthal as *R. longifrons* Kük. var. *reducta*); Colpothrinax savanna, vicinity of Herradura, Pinar del Rio, *Britton, Britton, Earle & Gager*, no. 6618 (NY, type; US, isotype); savannas at La Ciega, Coabilla, Camaguey, *Acuña*, no. 4396 (NY).

29. R. joveroensis Britt. Densely caespitose with stiff quill-like bases: leaves 1–2 mm. wide, 3.9–6 dm. long, canaliculate, stiffly ascending, with arched filiform tips; upper margins setiferous: culms terete, rigidly erect, 2.6–4.5 dm. tall: cymes congested-spiciform; the terminal one 0.5–1 cm. wide, 2.5–4 cm. long, exceeded by a setaceous recurving bract 1.8–2.5 dm. long; the lateral smaller, on an included peduncle: spikelets ovoid, 3.5–4 mm. long, extremely compact, sessile, 1-flowered, with the achene terminating the axis: scales aristulate, tightly involute, castaneous: stamens 3–4: bristles 6–8, delicate, upwardly serru-

late, connivent at their tips, approximating the tubercle in length; bases without prominent hairs: achene obovoid, lenticular, with compressed margins and a prominent umbo which may be glossy, remainder of surface dull, smooth, brown, 1.2–1.3 mm. wide, 1.4–1.5 mm. long: tubercle deltoid-compressed, with heavily setose margins, 0.6–0.8 mm. long. PLATE 824, FIGS. 4A and 4B; MAP 32.—Mem. Soc. Cubana Hist. Nat. ii. 195 (1916). *R. longifrons* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 209 (1926). —Lake margins, western Pinar del Rio, Cuba. CUBA: wet sand, Laguna Jovero to Laguna del Bufeo, Pinar del Rio, *Shafer*, no. 10992 (NY, TYPE; G, US, ISOTYPES); Hacienda San Julian, south of Guane, Pinar del Rio, *León & Roca*, no. 6935 (NY); shore of Laguna El Punto, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 18263 (NY. One of several Ekman numbers cited by Kükenthal after type-description of *R. longifrons*); banks of south Lagoon, Santa Maria, near San Luis, Pinar del Rio, *León*, no. 19627 (G).

30. R. BALDWINII Gray. Forming a coarse clump: radical leaves commonly short, flat becoming carinate, 3–4 mm. broad, tips acutely triquetrous due partially to development of the keel; upper margins and keel finely serrulate: culms triquetrous, erect, becoming flexuous, 0.5–1 m. high: terminal fascicle corymbiform, 1.6–2 cm. wide, rarely accompanied by a small fascicle on a short stiff erect branchlet; lateral fascicles smaller, simple, exsertly pedunculate: spikelets ovoid, 1–3-flowered, 1–2-fruited, sessile, bursting, 5–5.5 mm. long: scales aristate, caducous, castaneous to dark brown: bristles 12, slender, typically convergent, upwardly hispidulous, shorter than the tubercle: achene ovoid to subrotund, lenticular-compressed, emarginate, dark brown, with a pale disc, smooth to minutely pitted, dull, 1.8–2 mm. wide, 2–2.5 mm. long: tubercle deltoid-compressed, whitish, 0.8–1 mm. long. PLATE 825, FIGS. 4A and 4B; MAP 33.—Ann. Lyc. N. Y. iii. 210, pl. 6, fig. 18[1] (1835); Chapman, Fl. So. U. S. 526 (1860); Small, Fl. 196 (1903) and Man. 182 (1933). *Phaeocephalum Baldwinii* House, Am. Midland Nat. vi. 201 (1920).—Peaty savannas and low pine barrens of the Coastal Plain from North Carolina southward through the peninsula of Florida and west to Mississippi. NORTH CAROLINA: savanna near Jacksonville, Onslow Co., *Godfrey*, no. 5822 (G); savanna near Burgaw, Pender Co., *Godfrey*, no. 4737 (G, NC); long-leaf pine and wire grass savanna, Carolina Beach, New Hanover Co., *Godfrey*, no. 4685 (G, NC). SOUTH CAROLINA: peaty excavated area in savanna at side of road, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 8 (G, NY); in damp stiff soils, Santee Canal, *Ravenel* (G). GEORGIA: rather dry pine barrens between

[1] Figures 19 and 18 were apparently reversed in the printing; *R. Baldwinii* is fig. 18, not 19 as listed.

Guyton and Springfield, Effingham Co., *Harper*, no. 934 (G, NY, US); sandy bog, Bullock Co., *Harper*, no. 852 (NY); moist pine barren 2 miles west of Glennville, Tatnall Co., *Eyles*, no. 6435 (CU); *Dr. Baldwin*, fragment from Herb. Schweinitz (NY, TYPE). FLORIDA: moist pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 4868 (G, NY, US); Hastings, St. Johns Co., *Tracy*, no. 9286 (G, NY, US); Tampa, Hillsborough Co., May, 1876, *Garber* (US); prairie, 18 miles east of Okeechobee City, St. Lucie Co., *Small et al.*, no. 9303 (NY); wet places, Bear Creek, Gadsden Co., June 1841, *Chapman* (G, in part); wet pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 256a (G, NY, US); pine barrens 8 miles west of Apalachicola, Gulf Co., *Eyles*, no. 5783 (CU); swamps, Walton Co., 1885, *Curtiss* (NY). ALABAMA: low pine barrens, Mobile, Mobile Co., June, 1870, *Mohr* (NY); *Sartwell* (G). MISSISSIPPI: Biloxi, Jackson Co., *Tracy*, no. 4894 (NC, NY, US). LOUISIANA: New Orleans, *Drummond* (G).

31. R. **Fernaldii,** sp. nov. Planta caespitosa: foliis basilaribus 1–1.5 mm. latis planis marginibus laevibus vel subtiliter serrulatis, apicem versus triquetris: culmis teretibus tenuibus rigide erectis 2.5–5.2 dm. longis: fasciculis 1–2 congestis corymbiformibus; lateralibus exsertis pedunculatis; pedunculis erectis: spiculis ovoideis 2–2.5 mm. longis sessilibus confertis erectis vel patentibus 3–4-floris 2–3-carpis: squamis aristulatis laxe imbricatis fuscis: setis 6 antrorse hispidulis rigide erectis, achaenio fere aequantibus: achaenio lenticulari-obovoideo, biconvexo, parvo (0.8 mm. lato 0.9–1 mm. longo) laevi furvo; disco leviter pallidiore: tuberculo compresso-deltoideo, 0.2–0.3 mm. alto. PLATE 825, FIGS. 3A and 3B; MAP 34.—Pine barrens of southern Georgia, northern Florida and coastal Alabama. GEORGIA: rather dry sandy road in pine barrens near Camp Cornelia, Charlton Co., Aug. 8, 1902, *Harper*, no. 1487 (G, TYPE; NY, US, ISOTYPES); near Lem Griffin's Camp, Okefenokee Swamp, Clinch Co., Oct. 1938, *Eyles*, no. 164 (CU); piney woods, Billy Island, Charlton Co., July 7, 1912, *Bradley*, no. 4 (P). FLORIDA: in a low pineland, 7 miles southwest of St. Augustine, St. Johns Co., Aug. 8, 1929, *O'Neill* (CU); Sanford, Orange Co., Aug. 23, 1899, *Pieters*, no. 301 (US); in low pinelands, Alva, Lee Co., Oct. 30, 1917, *Francis*, no. 41 (US); low pine barrens near the seashore, Apalachicola, Franklin Co., Oct. 27, 1895, *Mohr* (US); pine barrens, Apalachicola, Franklin Co., July, 1870, *Chapman* (US); low pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 5963 (G, NY; US, in part); *Chapman* (P, no locality given). ALABAMA: *Buckley*, no. 35 (NY).

In habit, *R. Fernaldii* suggests a dwarfed state of *R. fascicularis* var. *distans*. The plant is tufted, the slender culm is stiffly

erect, and the small terminal fascicle is corymbiform and frequently accompanied by a lateral fascicle on a slender peduncle. However, among the members of this series the spikelets and achenes of this species are unique in their minuteness. The former measure only 2–2.5 mm. in length and the tiny blackish achene varies from 0.9–1 mm. in length. I suspect that this character was in part responsible for the long neglect of this species, for at first glance the inflorescence does suggest an undeveloped state of var. *distans*. This species has been named in honor of Professor M. L. Fernald.

32. R. gracilenta Gray. Caespitose: radical leaves filiform, about 10 mm. high, cauline leaves filiform to usually 1–2.5 mm. wide, flat; upper margins serrulate; tips triquetrous: culms terete, slender, erect to flexuous, 0.3–1 m. in height: terminal cyme a single fascicle, irregular in outline to corymbiform, with few spikelets, 0.8–1.2 cm. wide; or less often several fascicles on stiff branchlets; lateral fascicles 1–2 (rarely 3) on exserted peduncles: spikelets ovate, split open by the developing achenes, bearing 2–3 florets, the lowermost of which is often abortive, 1–2-fruited, sessile, 3–3.5 mm. long: scales aristate, castaneous: bristles 6, delicate, upwardly serrulate, falling short of to slightly exceeding the tubercle: achene oval to suborbicular in outline, 1.1–1.7 mm. wide, 1.3–1.8 mm. long, compressed, umbonate, smooth, dull dark brown at maturity, often with a conspicuous light disc: tubercle broad-based, with a long slender strap-like terminal extension, strongly compressed, 1–2.6 mm. long. Plate 826, figs. 6A and 6B; Map 36.—Ann. Lyc. N. Y. iii. 216, pl. 6, fig. 27 (1835); Chapman, Fl. So. U. S. 527 (1860); Britton & Brown, Ill. Fl. i. 279, fig. 657 (1896); Britton, Man. 186 (1901); Small, Fl. 195 (1903) and Man. 182 (1933); Robinson & Fernald in Gray, Man. ed. 7: 200, fig. 320 (1908); Britton, Mem. Soc. Cubana Hist. Nat. ii. 196 (1916); Kükenthal, Fedde Rep. Spec. Nov. xxiii. 208 (1926). *R. gracilenta* var. *diversifolia* Fernald, Rhodora, xxxvii. 399 (1935). *R. fusca* sensu Gray, Gram. et Cyp. i. no. 93 (1834), in part.[1] *R. Drummondiana* Boeckeler, Fl. xli. 644 (1858). *R. trichophylla* Fernald, Rhodora, xxxix. 389 (1937). *Phaeocephalum gracilentum* House, Am. Midland Nat. vi. 202 (1920).—Bogs and moist areas in swales, common along the Coastal Plain from New Jersey to southeastern Virginia; apparently more scattered southward in the Carolinas and Georgia;

[1] No. 93 was apparently made up from a mixed collection. In the volume belonging to the library of the New York Botanic Garden, no. 93 is *R. gracilenta*, as stated by Gray in an appended correction; but in the volume belonging to the Gray Herbarium, no. 93 is *R. fusca* (L.) Ait. f., as stated on the original label.

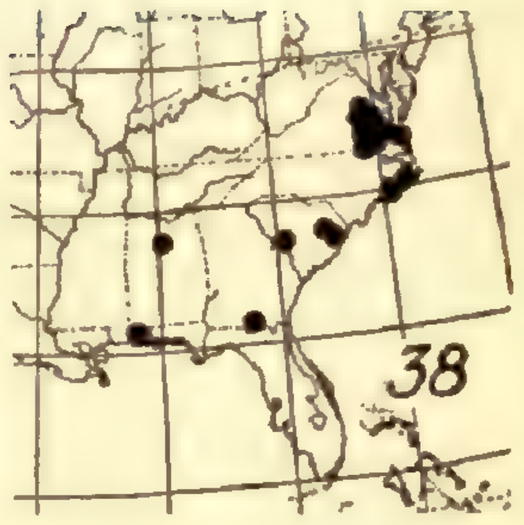
westward along the coast to eastern Louisiana; infrequent inland stations in the mountains of Virginia, North Carolina and Tennessee, and in central Arkansas and eastern Texas. The citation of the bulk of specimens from New Jersey and states south to Virginia has been omitted. NEW JERSEY: "pine barrens of N. J., Aug.–Sept." in Gray's handwriting (NY, TYPE). VIRGINIA: cranberry-meadow in wet spots, Stuart's Draft, Augusta Co., *Carr*, no. 303 (G). NORTH CAROLINA: wet grassy pineland, 12 miles west of Swan Quarter, Hyde Co., *Oosting*, no. 22 (D); low pineland at Dunn, Harnett Co., *Godfrey*, no. 6140 (D, G); sphagnum swamp, vicinity of Black Mt., Buncombe Co., *Standley & Bollman*, no. 10464 (US); dry sandy soil near Supply, Brunswick Co., *Blomquist*, no. 11266 (D, G). SOUTH CAROLINA: grass-sedge bog or savanna, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 60 (D, G, NY); grass-sedge bog or savanna, 1 mile west of Chicora, Berkeley Co., July 24, 1939, *Godfrey & Tryon* (G); Sumter, Sumter Co., *Bartram*, no. 3740 (P); Aiken, Aiken Co., July–Aug., 1866, *Ravenel* (G). GEORGIA: pine barren, Pooler Road near Ogeechee Canal and Little Ogeechee River, Chatham Co., *Eyles*, no. 6239 (CU); moist pine barrens, Rushing Pond, near Statesboro, Bullock Co., *Eyles*, no. 6185 (CU); moist meadow, Leslie, Sumter Co., *Harper*, no. 414 (G, NY, US). FLORIDA: sphagnous swamps near Jacksonville, Duval Co., *Curtiss*, no. 5072 (CA, NC, NY, US); Marianna, Jackson Co., *Tracy*, no. 4887 (US); wet pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 4478a (G, NY, US). ALABAMA: Lee Co., June 29, 1897, *Earle & Baker* (NY); in a wet place, Perdue, Coffee Co., *Blanton*, no. 84 (G, US). TENNESSEE: permanently moist meadow with ox-bows of Abrams Creek, west end of Cades Cove, Blount Co., Great Smoky National Park, alt. 1700 ft., *Camp*, no. 1993 (US); grassy borders of small pond south of Altamont, Grundy Co., *Svenson*, no. 9181 (G); bogs between Tracy City and Coalmont, Grundy Co., *Svenson*, no. 9568 (G). MISSISSIPPI: Ocean Springs, Jackson Co., *Pollard*, no. 1005 (G, NY, US); Biloxi, Harrison Co., *Tracy*, no. 7003 (G, NY); Bay of St. Louis, Hancock Co., Sept. 13, 1883, *Langlois* (G, NY). ARKANSAS: sandy bogs, Malvern, Hot Spring Co., *Palmer*, no. 8095 (CA, Mo, P, US). LOUISIANA: vicinity of Covington, St. Tammany Parish, *Arsène*, no. 11735 (Mo); dampish soil, 2 miles west of Hammond, Tangipahoa Parish, *Trotter & Chilton*, no. 153 (La); New Orleans, Orleans Parish, *Drummond*, no. 397 (G, ISOTYPE of *R. Drummondiana* Boeckeler). TEXAS: swamps, Swan, Smith Co., *Reverchon*, no. 2921 (Mo) and no. 2918 (Mo); ponds, Hempstead, Waller Co., *Hall*, no. 717 (G).

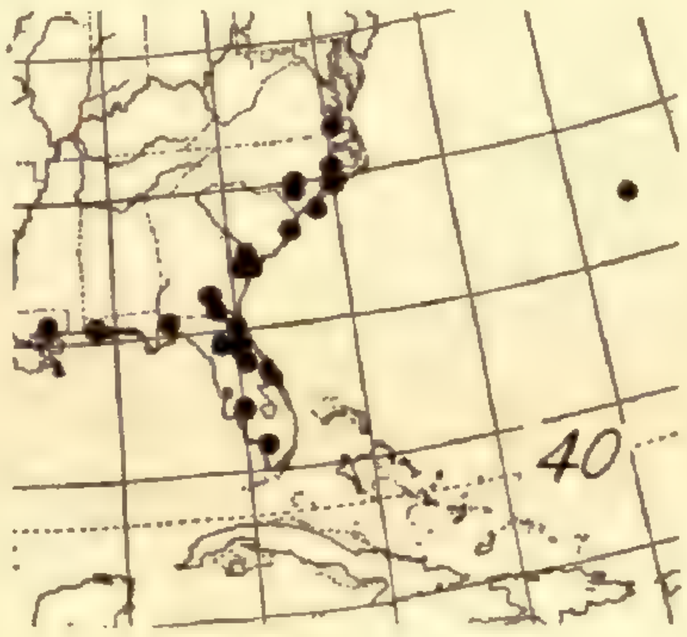
A study of specimens of *R. gracilenta* selected to represent its

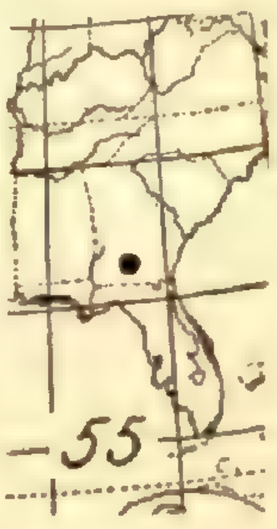
entire range tends to minimize the significance of var. *diversifolia* Fernald. This variety was defined on a basis of its "stiffer habit, broadish cauline leaves, and longer spikelets, fruits and tubercles." However, a stiffer habit and broader cauline leaves are not always accompanied by spikelets with larger achenes, and vice versa; nor would it be practical to re-define var. *diversifolia* solely upon the size of its achene, for the common occurrence of achenes of intermediate sizes would make the choice of definitive measurements purely arbitrary.

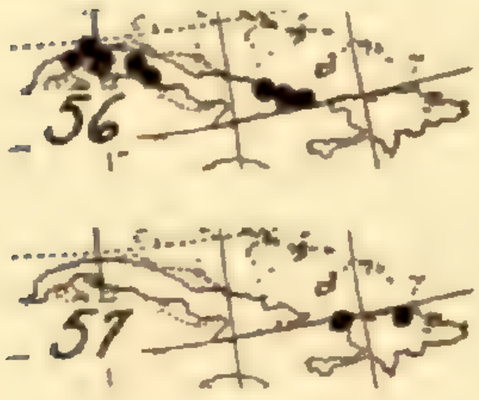
R. trichophylla Fernald was based on a peculiar colony in Sussex Co., Virginia. Identical in habit with the more robust specimens of *R. gracilenta*, this material bears achenes distinguished by bristles which barely equal the slightly prolonged deltoid tubercles. Typical achenes of *R. gracilenta*, on the other hand, have long bristles often exceeding the long strap-like tubercle. However, a close study of the material of *R. gracilenta* reveals that short bristles as well as the deltoid-attenuate tubercle of *R. trichophylla* fall within the range of achenial variability of the former species.

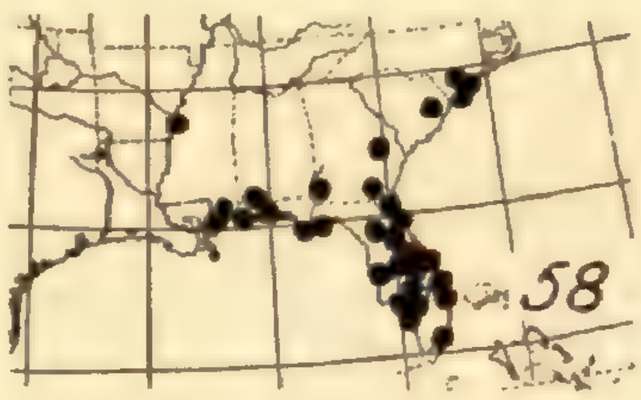
33. R. Wrightiana Boeckl. Densely tufted: leaves usually filiform to rarely 1.3 mm. wide, ascending to loosely spreading: culms filiform or very slender, wiry, stiffly erect to weakly ascending, leafy, 1–4.6 dm. high: fascicles 1–2, rarely 3, with 1–few spikelets, not exceeding 1 cm. in width; lateral fascicles on subexserted peduncles: bracts setaceous, several well exceeding the fascicle: spikelet ovoid, usually split, revealing the tubercle and upper portion of the achene, 1–2-flowered, with a rudimentary floret terminating the axis, 1–2-fruited, sessile, 3–3.5 mm. long: scales mucronate, castaneous, caducous: bristles 6, variable in height but rarely exceeding the achene, upwardly serrulate: achene elliptic in outline, biconvex, 1.2–1.3 mm. wide, 1.3–1.5 mm. long, smooth, dark brown; a somewhat paler disc indistinct or lacking: tubercle triangular-compressed, 0.6–0.8 mm. long, the tip prolonged as a broad, blunt beak. Plate 825, figs. 5A and 5B; Map 37.—Flora, lxiv. 78 (1881); Britton, Mem. Soc. Cubana Hist. Nat. ii. 197 (1916); Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 104 (1923); Small, Man. 183 (1933), excl. syn. *R. brachychaeta* Sauv. *R. gracillima* C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 85 (1871) and Fl. Cub. 181 (1873). *R. tenuis* Baldwin ex Gray, Ann. Lyc. N. Y. iii. 217 (1835), publ. in syn. of *R. distans* var. β., non Link. *R. distans* var. β. Gray, Ann. Lyc. N. Y. iii. 217 (1835). *R. distans*

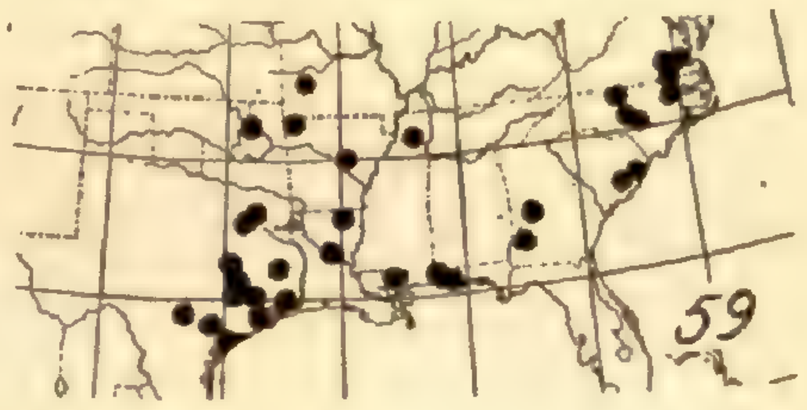












Range of 36, Rhynchospora gracilenta; 37, R. Wrightiana; 38, R. debilis; 39, R. fascicularis, var. typica; 40, R. fascicularis, var. distans; 41, R. stenophylla; 42, R. pruinosa; 43, R. crispa; 44, R. Shaferi; 45, R. nipensis; 46, R. cernua; 47, R. tenuifolia; 48, R. depressa; 49, R. rariflora; 50, R. scabrata; 51, R. scabrata, var. laevifolia; 52, R. Lindeniana, var. typica; 53, R. Lindeniana, var. bahamensis; 54, R. Grayii; 55, R. culixa; 56, R. cubensis; 57, R. stenophylloidea; 58, R. megalocarpa; 59, R. Harveyi.

var. *tenuis* (Baldwin) Britton, Trans. N. Y. Acad. Sci. xi. 90 (1892). *R. brachychaeta* sensu Small, Fl. 196 (1903), non C. Wright in Sauvalle. *R. pallida* sensu Clarke in Urban, Symb. Ant. ii. 126 (1900), in part, non M. A. Curtis. *R. distans* (Michx.) Vahl var. γ. *gracillima* (C. Wright) Kükenthal, Fedde Rep. Spec. Nov. xxiii. 208 (1926) and xxxii. 77 (1933).—Wet sand or peat of ditches, swamps, ponds or pockets in pineland of the Coastal Plain from southern North Carolina south to the Florida Peninsula and westward in coastal Alabama; also ponds of Cuba and mountains of Puerto Rico. North Carolina: wet sand, Fort Caswell, Brunswick Co., *Godfrey & Shunk*, no. 4140 (G, immature). South Carolina: peaty pocket in pine barren, 5½ miles south of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 201 (G, NY, P); peaty pocket in pine barren, 5 miles northwest of McClellanville, Charleston Co., *Godfrey & Tryon*, no. 1120 (G, NY); gum-pond in pine barren, 4 miles west of Bonneau, Berkeley Co., *Godfrey & Tryon*, no. 1625 (G, NY); margin of barrow-pit near Savannah River Refuge, Jasper Co., *Eyles*, no. 6123 (CU). Georgia: drainage-ditch, Wilmington Island, Chatham Co., *Eyles*, no. 4380 (D); pine barrens, Bethesda Church, Effingham Co., *Eyles*, no. 6104 (CU); moist sandy place, Bullock Co., *Harper*, no. 897 (NY, US); margin of pine-barren pond about 2 miles northeast of Hawkinsville, Pulaski Co., *Harper*, no. 1376 (G, NY); sandy soil along railroad near Douglas, Coffee Co., *Harper*, no. 684 (NY, US). Florida: moist pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 4946 (G, NY, US) and 3152 (CU, D[1], G, NY, P, US); low pineland, vicinity of Eustis, Lake Co., *Nash*, no. 662 (G, NY, P, US) and no. 642 (G, NY, US); grassy swamp, Okeechobee Region, Brevard Co., *Fredholm*, no. 5750 (G, NY, immature); prairie, 18 miles east of Okeechobee City, St. Lucie Co., *Small et al.*, no. 9304 (NY); wet place, Hardin Co., July 29, 1940, *Schallert* (G, in part). Alabama: Mobile, Mobile Co., July 16, 1897, *Mohr* (CU). Cuba: swampy place, pinelands at km. 12 of the highway to La Coloma, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17824 (NY); shore of Laguna de Junco, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17861 (G, US); "sobre tembladeras en medio de lagunas, en la Vuelta de Abajo"[2], *Wright*, no. 3781 (G, type; NY, US, probable isotypes). Puerto Rico: plants of the Luquillo Mt., *Wilson*, no. 97 (NY); in monte Jimenes, S[a] de Luquillo, *Sintenis*, no. 1381 (NY, US).

This species was originally described by Wright in 1873 under the name of *R. gracillima*. Boeckeler, however, in 1881, noting

[1] One sheet of this number from Duke University is *R. fascicularis* (Michx.) Vahl var. *distans* (Michx.) Chapman.

[2] C. Wright in Sauvalle, Fl. Cub. 181 (1873).

an earlier application of this name by Thwaites[1] in 1864 to a species from Ceylon, renamed the West Indian species *R. Wrightiana*, in honor of its collector. Subsequently its status was confused by C. B. Clarke who mistakenly placed *R. Wrightiana* in the synonymy of the Atlantic coastal species *R. pallida* M. A. Curtis. With *R. brachychaeta* it formed the basis for Clarke's report of *R. pallida* from the West Indies. The plant which extends northward into southeastern Virginia and which has there passed as *R. Wrightiana* is *R. debilis*.

34. R. FASCICULARIS (Michx.) Vahl. Caespitose, often coarsely so: radical leaves 1 (rarely less) to 4 mm. wide, curling to erect, flat, margins and keel finely serrulate: culms subterete and slender to stout and obtusely 3-angled, stiffly erect, becoming flexuous, 0.4 (rarely)–1.3 m. high: terminal fascicle simple or corymbosely compound, 1–5.5 cm. wide, the ultimate densely fasciculate clusters borne on stiff erect peduncles, lateral fascicles 1–3 or none, simple or less commonly compound, distant, exserted to subexserted on short erect peduncles: bracts several, foliaceous to setaceous, exceeding the fascicles: spikelets lance-ovoid to ovoid, 3–4.5 mm. long, erect, sessile, 2–4-flowered, with a terminal rudimentary floret, 1–3-fruited: scales ovate to lanceolate, prominently mucronate to aristate, caducous, 3–4 mm. long: bristles 5–6, rudimentary and short to well developed and exceeding the achene, stiffly erect, antrorsely serrulate: achene ovate to orbicular or elliptic, smooth, chestnut- to blackish-brown, evenly biconvex to umbonate, with or without a pale disc, obscurely marginate, 1.1–1.5 mm. wide, 1.3–1.5 mm. long: tubercle variable but essentially deltoid to deltoid-subulate, 0.4–0.7 mm. long.

34a. Var. **typica.** Habit usually very robust: spikelets usually with a conspicuous recurved mucro: achene ovate to orbicular, rarely elliptic, dark to blackish brown, umbonate, usually relieved by a prominent pale disc, 1.2–1.5 mm. wide, 1.4–1.5 mm. long: tubercle variable but essentially deltoid to deltoid-subulate. PLATE 825, FIGS. 1A and 1B; MAP 39.—*R. fascicularis* (Michx.) Vahl, Enum. ii. 234 (1806); Elliott, Sk. Bot. S. Car. and Ga. i. 60 (1816); Gray, Ann. Lyc. N. Y. iii. 210, pl. 6, fig. 20 (1835); Chapman, Fl. So. U. S. 527 (1860); Clarke in Urban, Symb. Ant. ii. 125 (1900), excl. syn. of European authors other than Vahl; Small, Fl. 196 (1903) and Man. 182 (1933); Britton, Mem. Soc. Cubana Hist. Nat. ii. 197 (1916). *Schoenus fascicularis* Michaux, Fl. Bor.-Am. i. 37 (1803). *R. distans* var. β. *fascicularis* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 208

[1] Thwaites, Enum. Pl. Zeyl. 435 (1864).

(1926). *Phaeocephalum fasciculare* House, Am. Midland Nat. vi. 202 (1920).—Roadside-ditches, peaty savannas, low pine barrens and lake-margins, Princess Anne County in southeastern Virginia, and common southward on the Coastal Plain from North Carolina to the Peninsula of Florida; less frequent in the coastal states west to eastern Texas; also in western Cuba, Jamaica, Hispaniola, Puerto Rico and Central America. VIRGINIA: wet peaty depressions in sandy pineland, The Desert, Cape Henry, Princess Anne Co., *Fernald & Long*, no. 3790 (G, P). NORTH CAROLINA: New Bern, Craven Co., *T. H. Kearney Jr.*, no. 1974 (US); pineland at sea-level, Carteret Co., *Godfrey*, no. 6408 (G, NC, NY); pineland, White Lake, Bladen Co., *Godfrey*, no. 5982 (D, G); drainage-ditch at Carolina Beach, New Hanover Co., *Godfrey*, no. 4724 (G); savanna, 7 miles southwest of Wilmington, Brunswick Co., *Godfrey & Shunk*, no. 4113 (G, NC). SOUTH CAROLINA: sandy drainage-ditch, 2 miles west of Salters, Williamsburg Co., *Godfrey & Tryon*, no. 512 (CU, D, G, NY, P); shallow peaty pond in pine barrens, 9 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 758 (D, G, NY); drainage-ditch, 3 miles north of McClellanville, Charleston Co., *Godfrey & Tryon*, no. 683 (G); grass-sedge bog or savanna, 3 miles southwest of Manning, Clarendon Co., *Godfrey & Tryon*, no. 940 (G, NY); grass-sedge bog or savanna, 1 mile west of Chicora, Berkeley Co., *Godfrey & Tryon*, no. 842 (G, NY); wet sand pockets, 5 miles north of Ridgeland, Jasper Co., *Wiegand & Manning*, no. 599 (G). CAROLINA, Juin, *Michaux* Herb. (G, TYPE-PHOTO.; NY, TYPE-FRAGMENT from Michx. Herb.). GEORGIA: moist sandy roadside in pine barrens, Bullock Co., *Harper*, no. 878 (G); Wilmington Island, Chatham Co., *Eyles*, no. 4891 (CU); Wayne Co., *Baldwin* (P); green sphagnum swamp, 9 miles north of Darien on U. S. Route 17, MacIntosh Co., *Eyles*, no. 6439 (CU); pine woods, Kingsland, Camden Co., *Small & DeWinkler*, no. 9682 (NY); pineland-pool just east of the Clinch Co. line on U. S. Route 84, Ware Co., *Eyles*, no. 6327 (CU); hammock at edge of swamp on Billy's Island, Okefenokee Swamp, Charlton Co., *Eyles*, no. 6356½ (CU); margin of pine-barren pond near Downing, Coffee Co., *Harper*, no. 1440 (G, NY, US); moist pine barrens, Thomas Co., *Harper*, no. 1173 (G, US). FLORIDA: moist pine barrens near Jacksonville, Duval Co., *Curtis*, no. 4945 (G); low pineland, Lake City, Columbia Co., *O'Neill*, no. 7675 (CU); Hibernia, Clay Co., Mar., 1869, *Canby* (G, NY, US); ditch near Clyatt's Station, Gainesville, Alachua Co., July 13, 1940, *Arnold* (CU); wet flatwoods, Welaka, Putnam Co., *Laessle*, no. 15 (CU); dry sand, high pineland, vicinity of Eustis, Lake Co., *Nash*, no. 641 (G, NY, US); near Sanford, Seminole Co., Aug., 1931, *Rapp* (NY); in a low pineland, Bithlo, Orange Co., *O'Neill*, no. 5268 (CU);

prairies near Lake Washington, Brevard Co., *Small & DeWinkler*, no. 9741 (NY); Kissimmee, Osceola Co., May 10, 1901, *Mearns* (US); ditch, Polk Co., July 27, 1940, *Schallert* (G); in wet ditch, Lake Jovita, Pasco Co., *Britton*, no. 2609 (CU); near water, near St. Petersburg, Pinellas Co., *Mrs. C. C. Deam*, no. 2899 (G); pinelands near Fellsmere, Indian River Co., *Small*, no. 8868 (NY); Okeechobee Prairie north of Okeechobee City, Okeechobee Co., *Small et al.*, no. 9238 (NY); Palma Sola, Manatee Co., *Tracy*, no. 6996 (G, NY, US); ditch, Sarasota Co., July 29, 1940, *Schallert* (G); pinelands, east of Punta Gorda, Charlotte Co., *Small, Mosier & DeWinkler*, no. 10928 (NY); around ponds, Myers, Lee Co., *Hitchcock*, no. 423 (G, NY, US); low pineland, 5 miles south of Stuart on east coast, Martin Co., *O'Neill*, no. 5265 (CU); St. Vincent Island, Franklin Co., *McAtee*, no. 1806 (US); low pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 4469 (G, NY, US); Lake Gentry, Santa Rosa Co., *Howell*, no. 1092 (US). Alabama: low pineland about Miflin Creek, Elberta, Baldwin Co., Aug. 25, 1926, *Wolf* (StB); low swampy pine barrens, Mobile, Mobile Co., July, 1872, *Mohr* (US). Mississippi: Ocean Springs, Jackson Co., *Pollard*, no. 1016 (D, G, NY, US); Long Beach, Harrison Co., Aug. 25, 1896, *Joor* (Mo); Cat Island, Hancock Co., *Lloyd & Tracy*, no. 359 (NY). Louisiana: in pine wood clearings, Slidell, St. Tammany Parish, Oct. 5, 1891, *Langlois* (NY); near Indian Village, east of New Orleans, Orleans Parish, *Killip*, no. 13968 (US). Texas: Jefferson Co., *Tharp*, no. 3055 (US). Cuba: in savannas, towards Bibijaguas, Nueva Gerona, Isla de Pinos, *Ekman*, no. 12535 (G, US); dry ground, Laguna Jovero and vicinity, Pinar del Rio, *Shafer*, no. 10752 (G, NY); sabanas, El Sabalo, Finca Sabanalamar, Pinar del Rio, near sea level, *Killip*, no. 32260 (CU); palm barrens west of Guane, Pinar del Rio, *Shafer*, no. 10500 (NY); among Acoeloraphe, on shore of laguna, Laguna Santa Maria, Pinar del Rio, *Ekman*, no. 17274 (US); sandy pine woods (damp) Pinar del Rio, Oct. 1863?[1] *C. Wright*, no. 3392[2] (NY); on edge of laguna, Herradura, Pinar del Rio, *Ekman*, no. 11585 (G); low savannas, Chirigota, Pinar del Rio, Oct. 26, 1863?[3] *Wright*, no. 3399?[2] (US); low wood at 420 m., north slope of Loma Pelada de Buenavista, Cayajabos, Pinar del Rio, *León*, no. 13561 (NY). Jamaica: summit of Bull Head, Chapelton to Bull Head, Middlesex, *Underwood*, no. 33646 (NY). Hispaniola: laterite soil at Dutreuil, Corail, Western Group, Massif de la Hotte, Dept. du Sud, Haiti, c. alt. 250 m., *Ekman*,

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905).

[2] The penciled number 3399 appears on 3 Wright sheets, the specimens of which are for the most part *R. fasciculatis*. These are undoubtedly no part of the original "Cuba or. (Wr. 3399)" on which Grisebach based in part his description of *R. deflexa*.

[3] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905).

no. 10741 (US); in savannas, El Valle, Sabana de la Mar, prov. de Samana, Cordillera Central, Dominican Republic, *Ekman*, no. 15667 (NY); forming colonies, in Sabana de Ponton, toward Cotui, Rincón, prov. de la Vega, Valle del Cibao, Dominican Republic, *Ekman*, no. 14623 (G, US). PUERTO RICO: in sphagnum, western end of Laguna Tortuguero, *Britton & Britton*, no. 7872 (NY, US); wet white sand, vicinity of Vega Baja, *Britton, Britton & Brown*, no. 5788 (NY); moist sandy soil, Santurce, *Heller & Heller*, no. 583 (NY, US).

34b. Var. DISTANS (Michx.) Chapm. Habit more slender than that of var. *typica:* spikelets mucronulate: achene elliptic in outline, gradually biconvex, not umbonate, chestnut to dark brown, without a well-defined central disc, 1.1–1.3 mm. wide, 1.3–1.5 mm. long: bristles 6, always exceeding the achene: tubercle compressed, triangular-subulate, with a narrow base. PLATE 825, FIGS. 2A and 2B; MAP 40.—Fl. So. U. S. 527 (1860). *Schoenus distans* Michaux, Fl. Bor.-Am. 1. 36 (1803). *R. distans* Vahl, Enum. ii. 235 (1806); Elliott, Sk. Bot. S. Car. and Ga. i. 59 (1816); Gray, Ann. Lyc. N. Y. iii. 216, pl. 6, fig. 28 (1835): Clarke in Urban, Symb. Ant. ii. 125 (1900); Small, Fl. 195 (1903) and Man. 182 (1933); Britton, Fl. Bermuda 53, fig. 81 (1918); Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 103 (1923); Kükenthal, Fedde Rep. Spec. Nov. xxiii. 208 (1926). *R. dommucensis* A. H. Moore, List of Pl. Coll. in Bermuda, 1905: 6, pl. 1 and 2 (1906). *Phaeocephalum distans* House, Am. Midland Nat. vi. 202 (1920). *Dichromena distans* Macbride, Field Mus. Pub. Bot. xi. 5 (1931).—Moist sandy or peaty pineland from southeastern Virginia southward along the Coastal Plain to the tip of Florida and west to Mississippi; also Bermuda. VIRGINIA: moist sandy and peaty pine barrens, south of Lee's Mill, Isle of Wight Co., *Fernald & Long*, no. 12273 (G, P); wet peaty pine barrens, east of Cox Landing, south of South Quay, Nansemond Co., *Fernald & Long*, no. 10551 (CU, G, NY, P) NORTH CAROLINA: savanna, Chocowinity, Beaufort Co., *Godfrey*, no. 5417 (G); sand-ridge, 5 miles west of Clinton, Sampson Co., *Godfrey*, no. 4502 (D, G); moist boggy places, north side of White Lake, Bladen Co., *Blomquist*, no. 10863 (D); pineland near Carolina Beach, New Hanover Co., *Godfrey*, no. 4708 (G, NC). SOUTH CAROLINA: peaty pocket in pine barren, 5 miles northwest of McClellanville, Charleston Co., *Godfrey & Tryon*, no. 1122 (D, G, P, NY). CAROLINA: *Michaux* (G, TYPE-PHOTO; NY, TYPE-FRAGMENT from Michaux Herb.). GEORGIA: shady woods between Guyton and Springfield, Effingham Co., *Harper*, no. 936 (G, NY, US); border of pond near Middleground Road, Chatham Co., *Eyles*, no. 6228 (CU); moist sandy roadside in pine barrens, Bullock Co., *Harper*, no. 878 (C, NY, US); margin of shallow pond in sandhills of Satilla River, Coffee Co., *Harper*, no.

1447 (G, NY, US); sphagnous bogs near Bugaboo Island, Okefenokee Swamp, Charlton Co., *Harper*, no. 1477 (G, NY, US); pine barren near Lem Griffin's, Okefenokee Swamp, Clinch Co., *Eyles*, no. 6373 (CU). Florida: damp shady woods near Jacksonville, Duval Co., *Curtiss*, no. 5072c (G, NY); low moist ground, Welaka, Putnam Co., *Laessle*, no. 20 (CU); flatwoods, Lake Helen, Volusia Co., Apr. 29, 1911, *Hood*, (G); marsh, Bithlo, Orange Co., *O'Neill*, no. 5117 (CU); "Bayhead" in wet soil, vicinity of Eustis, Lake Co., *Nash*, no. 802 (CU, G, NY, US); cypress swamp, northeast of Labelle, Lee Co., April 24, 1921, *Small & DeWinkler* (NY); sandhills east of Sebring, DeSoto Co., *Small & DeWinkler*, no. 9074 (NY); ancient sand dunes about Lake Jackson, Leon Co., *Small, Mosier & DeWinkler*, no. 10874 (NY). Alabama: low pineland about Miflin Creek, Elberta, Baldwin Co., Aug. 25, 1926, *Wolf* (StB). Bermuda: Pembroke Marsh, *Brown, Britton & Bisset*, no. 2122 (NY); Devonshire Marsh, *Brown & Britton*, no. 170 (NY); Devonshire Marsh, *A. H. Moore*, no. 3004 (G, type of *R. domucensis* A. H. Moore; NY, isotype).

The variability of this species, both in habit and appearance of the achene, was undoubtedly responsible for its original separation by Michaux into two distinct species, *Schoenus fascicularis* and *S. distans*. In 1805, Vahl transferred both species to *Rhynchospora;* and later Gray, following established precedent, also recognized both *R. fascicularis* and *R. distans*. However, in 1860 Chapman reduced *R. distans* to varietal rank under *R. fascicularis*, and in the third edition of his Flora dismissed it as "*R. distans* Nutt. the form with longer bristles." In 1926, Kükenthal, although apparently unfamiliar with the Flora of the Southern United States, reached a conclusion similar to that held by Chapman. The former, however, preferred to keep *R. distans* as the species and subordinated *R. fascicularis* as *R. distans* var. *fascicularis*. Obviously this was an unfortunate choice since, by International Rules, if the varietal rank is to be maintained the earlier decision of Chapman to preserve *R. fascicularis* and reduce *R. distans* must be followed.

Along the coastal plain from Virginia to Florida and west to Louisiana, *R. fascicularis* has been identified as a caespitose plant with a shock of coarse, often curling basal leaves 2–4 mm. wide, much shorter than the stiffly erect, subtriquetrous culms. The terminal cyme is nearly always irregularly compound, the spikelets 3–4.5 mm. long and composed of prominently aristate

scales 3–4 mm. in length. The achene is usually ovate to orbicular in outline, less frequently elliptic. Its surface is consistently smooth, blackish-brown, with a prominent pale disc. On smaller achenes, however, the disc may be indistinct or absent. Specimens from Virginia and Carolina have short rudimentary bristles not exceeding ½ the achene in height; but in Georgia and Florida occasional specimens occur in which the bristles may equal or exceed the achene.[1]

R. fascicularis in Cuba, Jamaica, Hispaniola and Puerto Rico is usually represented by comparatively poorly developed specimens with reduced inflorescences. The achenes of these specimens are, however, both long- and short-bristled, and are indistinguishable from those of the mainland.

All specimens with long-bristled achenes were formerly assigned to *R. distans*. According to previous definition, in addition to the increased length of its bristles, *R. distans* was separable from *R. fascicularis* by its consistently more slender habit. However, typically robust specimens of *R. fascicularis* from Florida and Georgia bear achenes with the long bristles of *R. distans;* and, vice versa, many of the more slender plants of the West Indies have rudimentary bristles, indicating *R. fascicularis*. To discriminate between *R. fascicularis* and *R. distans* on the basis of bristle-length or comparative size is to set up an arbitrary distinction.

On the other hand, slender specimens from Virginia, Bermuda and Carolina south to the tip of Florida and west to Mississippi, bear achenes which are consistently long-bristled, smaller in size, characteristically elliptic in outline, with evenly browned surfaces, and narrow-based, triangular, subulate tubercles. To this category belong the fragments of *S. distans* from the Michaux Herbarium secured by Dr. Torrey and now in the Herbarium of the New York Botanical Garden, so that the name, *R. fascicularis* var. *distans* (Michx.) Chapm. is properly applied to them. The coarse plants with strongly mucronate scales but dark ovate achenes and well developed bristles may be con-

[1] The original description of *S. fascicularis* was possibly based on a long-bristled individual, for Michaux states "setulis semine laevi duplo longioribus." Asa Gray, however, reports that achenes from the Michaux type have short rudimentary bristles, which is true of the fragment from the Michaux Herbarium now in the Herbarium of the New York Botanical Garden.

sidered as possibly transitional between this variety and the robust, short-bristled, widely-spread *R. fascicularis* var. *typica*.

35. R. **debilis,** sp. nov. Caespitosa: foliis vel filiformibus debilibus ascendentibusque vel 1 mm. latis erectis planis; marginibus apicem versus subtiliter serrulatis: culmis filiformibus rigidisque subteretibus, laxe ascendentibus vel procumbentibus, 2.5–4.4 dm. altis: fasciculis 1–(rare)2; fasciculo terminali congesto corymboso parvo (0.5–1.1 cm. lato); spiculis late ovoideis 2.5–3.2 mm. longis, sessilibus, confertis, 2-floris, tertio rudimentario, 1–2-carpis, saepe ab achaenio maturante apertis: squamis fertilibus fissilibus, quam achaenio brevioribus, valde caducis, castaneis vel fuscis, costis pallidis; setis 5–6 quam achaenio duplo brevioribus aut minus, antrorse serrulatis: achaenio late ovato vel orbiculari, lenticulari biconvexo 1.4–1.6 mm. lato 1.3–1.5 mm. longo laevi castaneo; disco pallidiore saepe obscuro; tuberculo compresso-deltoideo saepe apiculato 0.3–0.4 mm. alto; basi lato. Plate 826, figs. 5A and 5B; Map 38.—? *R. fascicularis* var. *trichoides* Chapman, Fl. So. U. S. 527 (1860), non *R. trichodes* Clarke.—Damp sandy or peaty clearings of the Coastal Plain from southeastern Virginia south to northern Florida and west to Alabama, with an inland station in the Alleghanies of Alabama. Virginia: exsiccated argillaceous swale, west of Petersburg Turnpike, north of Swift Creek, Chesterfield Co., July 18, 1936, *Fernald & Long*, no. 6084 (G, NY, P); wet pineland south of Petersburg, Prince George Co., July 13, 1938, *Fernald & Long*, no. 8602 (G, P); wet peaty clearing about 1 mile northeast of Burgess, Dinwiddie Co., Sept. 13, 1937, *Fernald & Long*, no. 7355 (G, P); sandy and peaty border of Cat Pond, south of Benns Church, Isle of Wight Co., June 15, 1938, *Fernald & Long*, no. 8118 (G, P, immature); damp sandy and peaty depressions back of the dunes, Rifle Range, south of Rudy Inlet, Princess Anne Co., July 30–31 and Aug. 4, 1934 *Fernald & Long*, no. 3797 (G, P); peaty and argillaceous clearing in pineland east of Courtland, Southampton Co., June 10, 1938, *Fernald & Long*, no. 8119 (CU, G, P, immature); depressions in argillaceous field north of Littleton, Sussex Co., July 22, 1936, *Fernald & Long*, no. 6085 (G, type; NY, P, US, isotypes); argillaceous and sphagnous meadow northwest of Taylor's Millpond, Greensville Co., June 12, 1939, *Fernald & Long*, no. 10145 (G, P). North Carolina: *Curtis* (P, no locality given); damp open sand 5 miles west of Swanquarter, Hyde Co., June 22, 1927, *Wiegand & Manning*, no. 598 (G); moist rich soil, low ground along main highway, Bettie, Carteret Co., July 17, 1922, *Randolph & Randolph*, no. 808 (G). South Carolina: cartroad through pineland-clearing, 5 miles south of Andrews, Georgetown Co., Aug. 11, 1939, *Godfrey & Tryon*, no. 1376 (D, G, NY);

sandy drainage-ditch, 2 miles west of Salters, Williamsburg Co., July 14, 1939, *Godfrey & Tryon*, no. 513 (G, NY); damp soils, Aiken, Aiken Co., Aug., 1866, *Ravenel* (G). GEORGIA: roadside, 5 miles east of Statenville, Echols Co., Dec. 31, 1937, *Eyles*, no. 2682 (CU). FLORIDA: *Chapman* (US, no. 61756). ALABAMA: wet situation, low woods, St. Bernard, Cullman Co., July 17, 1909, *Wolf*, no. 479 (StB); Mobile, Mobile Co., May, 1845, *Sullivant* (G); May, 1841, *Buckley* (G).

R. debilis, *R. Wrightiana* and the two varieties of *R. fascicularis* probably constitute the most difficult group of species within the Section *Eurhynchospora*. Both *R. debilis* and *R. Wrightiana*, for which *R. debilis* has been mistaken, are characterized by their wiry, filiform to slender culms which tend to become procumbent. The basal leaves of *R. Wrightiana* are typically filiform and sinuously ascending, often equalling the culm in height; rarely they are 1.3 mm. wide and stiff. The reverse is true of *R. debilis*. Its leaves are more often 1 mm. wide, flat, stiffly ascending and shorter than the culms. Occasionally, however, they are filiform, and then indistinguishable from those of *R. Wrightiana*. Similarly the fascicles of both species may be identical in appearance but, whereas those of *R. Wrightiana* are often reduced to 1 or 2 spikelets, those of *R. debilis* are typically corymbose and congested. A comparison of the achenes gives the most certain means of discrimination. That of *R. debilis* is round-ovate to orbicular, slightly umbonate, normally pale in the center, with dark brown somewhat depressed sides and blunt margins. It is surmounted by a deltoid broad-based tubercle which may be apiculate. The 5–6 subtending bristles are rudimentary, uneven in length, and rarely equalling ½ the achene. The achene of *R. Wrightiana*, on the contrary, is elliptic to suborbicular in outline, evenly biconvex, not umbonate, homogeneously brown or nearly so, and immarginate. The tubercle is basally deltoid but, unlike that of *R. debilis*, is apically prolonged into a broad blunt bill. The six bristles, although uneven in length, are well developed, often equalling the achene.

R. fascicularis is, by comparison with *R. debilis* and *R. Wrightiana*, a coarse, robust species. Of its two varieties only the weaker specimens of var. *distans*, with their narrow leaves, attenuated culms and reduced corymbs, might be confused with the more robust specimens of *R. debilis* or even *R. Wrightiana*. However,

the culms of normal specimens of var. *distans* are rarely, if ever, procumbent, the basal leaves are coarse, often spreading and curling, never filiform, with some of them at least 2 mm. wide, and in no case approximating the culm in height. The achene of *R. distans* most closely resembles that of *R. Wrightiana*. It is elliptic in outline, 1.1–1.3 mm. wide, 1.3–1.5 mm. long, evenly browned, and surrounded by six well developed bristles which frequently exceed the achene in height. However, the tubercle is merely triangular-attenuate, without the broad bill-like extension characteristic of *R. Wrightiana*. It is this difference in the character of the tubercle, coupled with the difference in habit, which leads one to believe that *R. Wrightiana* is a good species, and not merely a delicate state of *R. fascicularis* var. *distans*.

The filiform (rarely 1 mm. wide) leaves and culms, both of which are characteristically lax to procumbent, the small spikelets with their round-ovate caducous scales, and its suborbicular achenes distinguish *R. debilis* from the much coarser *R. fascicularis* var. *typica*. In habit it more nearly approaches *R. fascicularis* var. *distans;* but, unlike the latter, does not possess the broad radical leaves, the stiffly erect culms, and the bristles which in var. *distans* equal the elliptic achene and occasionally exceed the tubercle.

R. debilis has, however, been most commonly confused with *R. Wrightiana* Boeckl. The latter species, first collected in Cuba by Wright, has since been found on the Coastal Plain from Florida to North Carolina. Like *R. debilis*, it has a weak, lax habit coupled with strictly filiform leaves and culms. The fascicles of *R. Wrightiana*, however, contain even fewer spikelets than those of *R. debilis*, and rarely form the small corymbiform glomerules characteristic of the latter. The essential distinction appears upon a comparison of the achenes. The achene of *R. Wrightiana* is commonly elliptic, exceeded by the six bristles, and surmounted by a deltoid-attenuated tubercle 0.7–0.8 mm. high. That of *R. debilis* is suborbicular, accompanied by 5–6 abortive bristles which do not exceed ½ the achene in height, and is topped by a short deltoid tubercle only 0.3–0.4 mm. high.

This entity was probably singled out by Chapman under the name *R. fascicularis* var. *trichoides;* but since Chapman's types are obscure, and the name *trichoides* is not available for transfer

to the species, being already preëmpted by Clarke for a West Indian species, *R. trichodes*, it seems best to treat the plant as a new species, and to designate a type. I have selected as descriptive of the lax to procumbent habit the epithet, "*debilis*" which is taken from a memorandum written in Chapman's hand and attached to a sheet of this species in the Gray Herbarium.

(To be continued)

RHYNCHOSPORA, SECTION EURHYNCHOSPORA, IN CANADA, THE UNITED STATES AND THE WEST INDIES

Shirley Gale

(*Continued from page 197*)

Series 6. **Rariflorae,** ser. nov. Foliis culmisque filiformibus erectis vel debilibus: cymis pluribus parvis patentibus: spiculis paucis remotis saepissime longe pedicellatis: setis antrorse serrulatis: achaenio ovoideo valde biconvexo castaneo vel pallido cancellato vel striato rugoso; rugis acutis.

Growing in bogs and on pond-margins of the Coastal Plain—*R. rariflora* infrequent inland and also occurring in the West Indies and Central America. Habit caespitose: leaves and culms filiform, erect to reclining: inflorescence of several small, open cymes: spikelets few, remote, mostly long-pedicellate: bristles upwardly serrulate, fragile: achenes ovoid, strongly biconvex, abruptly ridged, cancellate to striate, castaneous or pale, with 2 small whitish tongues of spongy tissue pushed out on either side at the base: tubercle deltoid, compressed.—*Rhynchospora* V. *Glomeratae* Small, Man. 175 (1933), in part. *Rhynchospora*, Series B. *Diplostyleae*, Sect. 4. *Fuscae* Clarke in Urban, Symb. Ant. ii. 105 (1900), in part.

Key to Species of Series Rariflorae

Spikelet 2–4-flowered, the achene when solitary accompanied by a sterile floret; bristles shorter than the achene; tubercle deltoid, 0.3–0.6 mm. high ..... 36. *R. rariflora.*

Spikelet usually 1-flowered, with the axis then terminated by the solitary achene; bristles nearly equal to or exceeding the deltoid-acuminate tubercle which is 0.8–1.4 mm. long .. 37. *R. stenophylla.*

36. R. rariflora (Michx.) Ell. Densely tufted: leaves filiform to 1 mm. wide, involute at least on drying, loosely erect; upper margins finely serrulate: culms filiform to very slender, wiry, flexuous to reclining, 2.4–5.6 dm. high: cymes 1–3, small, lax, open, with few spikelets, corymbiform, the capillary branchlets ascending to spreading; spikelets broadly ovoid, rarely sterile, remote, long-pedicelled, 2–4-flowered, 1–3-fruited, 3–4 mm. long: scales round-ovate, obtuse, castaneous, often pushed apart at maturity: bristles 6, upwardly serrulate, unequal in length, the longest shorter than the achene: achene obovoid to rotund, strongly biconvex, 1.1–1.4 mm. wide, 1.3–1.4 mm. long, castaneous, traversed by abrupt ridges, striate to oblong-cancellate between the ridges; two small whitish ascending tongues of spongy tissue pushed out on either side at the base: tubercle compressed, deltoid, 0.3–0.6 mm. high. Plate 828,

figs. 4A and 4B; Map 49.—Sk. Bot. S. Car. and Ga. i. 58 (1816); Gray, Ann. Lyc. N. Y. iii. 197, pl. 6, fig. 3 (1835); Chapman, Fl. So. U. S. 524 (1860); Britton, Trans. N. Y. Acad. Sci. xi. 92 (1892); Clarke in Urban, Symb. Ant. ii. 130 (1900); Small, Fl. 196 (1903) and Man. 183 (1933); Britton, Mem. Soc. Cubana Hist. Nat. ii. 197 (1916); Kükenthal, Fedde Rep. Spec. Nov. xxxii. 78 (1933). *Schoenus rariflorus* Michaux, Fl. Bor.-Am. i. 35 (1803); Muhlenberg, Descript. Gram. 10 (1817). *R. setacea* sensu Grisebach, Cat. Pl. Cub. 243 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 180 (1873); non Vahl. *Phaeocephalum rariflorum* House, Am. Midland Nat. vi. 202 (1920).—Open peaty depressions, bogs, or pond-margins of the Coastal Plain from New Jersey and southeastern Virginia south to the Florida Peninsula and west to Texas, with isolated inland stations in the mountains of Georgia, in central Tennessee and northern Texas; also in western Cuba, the Isle of Pines, Jamaica, the Dominican Republic, and Central America. New Jersey: clay-bottomed bog, Cold Spring, Cape May Co., *Gershoy*, no. 168 (G). Virginia: boggy swale, Otterburn, about 1 mile west of Amelia Court House, Amelia Co., *Fernald & Long*, no. 8986 (G, P); sphagnous bog about 1 mile northeast of Burgess, Dinwiddie Co., *Fernald & Long*, no. 7354 (G, P); argillaceous and siliceous boggy depressions about 3 miles southeast of Petersburg, at head of Poo Run, Prince George Co., *Fernald, Long & Smart*, no. 5656 (G); wet peaty margin of pine woods about 3 miles southeast of Zuni, Isle of Wight Co., *Fernald & Long*, no. 6083 (G, P); damp peaty meadows behind dunes, Rifle Range, south of Rudy Inlet, Princess Anne Co., *Smith & Hodgdon* in Pl. Exsic. Gray. no. 624 (CU, G, NY, P, US); peaty openings bordering wooded swamp along Mill Creek, about 1 mile north of Skippers, Greensville Co., *Fernald & Long*, no. 8601 (G, P). North Carolina: open pine forest, used soil south of Bennett Memorial, west of Durham, Durham Co., *Blomquist*, no. 9803 (D); edge of swamp, ½ mile within west boundary of county, highway 264, Nash Co., *Blomquist*, no. 7686 (D); rich moist low soil near Chocowinity, Beaufort Co., *Correll*, no. 1589 (D); moist rich soil, waste ground, Bettie, Carteret Co., *Randolph & Randolph*, no. 796 (G); damp soil, Fayetteville, Cumberland Co., *Biltmore Herb.*, no. 259b (US); dried-out road-making sand pit, 4 miles east of Bolton, Columbus Co., *Wiegand & Manning*, no. 622 (G); in roadside-ditch near Bolivia, Brunswick Co., *Blake*, no. 11893 (CU). South Carolina: Aiken, Aiken Co., July, *Ravenel* (G); sunny banks near pond, Lotus Pond, Savannah River Refuge, Jasper Co., *Eyles*, no. 6085 (CU). Georgia: Little Stone Mt., DeKalb Co., July 25, 1893, *Small* (NY); wet woods about 2 miles west of Wrightsville, Johnson Co., *Harper*, no. 1345 (NY, US); low grounds near depot, Millen, Jenkins Co.,

Harper, no. 781 (G, NY, US); moist sandy roadside, Bullock Co., *Harper*, no. 879 (G, NY, US); pine barren, 13 miles north of Waycross, Ware Co., *Eyles*, no. 7027 (G); low wet edge of woods between Folkston and Mattox, Charlton Co., *Correll*, no. 5520a (D); moist pine barrens, near Huntington, Sumter Co., *Harper*, no. 1396 (G, NY, US); damp margin of cypress-pond about a mile north of Jakin, Early Co., *Harper*, no. 3629 (P, US); *Michaux Herb.* (G, TYPE-PHOTO; NY, TYPE-FRAGMENT from Michaux Herb.). FLORIDA: moist pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 4870 (G, NY, US); Eustis, Lake Co., *Nash*, no. 438 (CU, G, NY, US); in a wet ditch in low pineland at the crossroads east of Fivay, Pasco Co., *O'Neill*, no. 2613 (CA, CU, US); Tampa, Hillsborough Co., Oct., 1877, *Garber* (G, P, US); in moist ditch along roadside, about 5 miles north of Parish, Manatee Co., *Moldenke*, no. 1053 (D, NY); cut-over flatwoods 5 miles east of Lake Rudy, vicinity of Polk Co., *McFarlin*, no. 5145 (CU); Istokpoga Prairie, between Lake Istokpoga and Kissimmee River, Okeechobee Co., *Small & DeWinkler*, no. 9058 (NY); Alapittah Flats, St. Lucie Slough to Lake Okeechobee, St. Lucie Co., *Small & DeWinkler*, no. 9513 (NY); low grassy pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 259a (NY, US). ALABAMA: Auburn, Lee Co., July 3, 1897, *Earle & Baker* (NY); boggy sunny slope near Jasmine (on M. and O. R. R.), Chilton Co., Apr. 28, 1921, *Harper* (NY; US with collector's no. 171); Mobile, Mobile Co., May, 1845, *Sullivant* (G). TENNESSEE: swamps between Spencer and Cagle, Van Buren Co., *Svenson*, no. 9644 (G). MISSISSIPPI: Ocean Springs, Jackson Co., *Tracy*, no. 4863 (NY, US); Biloxi, Harrison Co., *Tracy*, no. 4890 (G, NC, NY, US). LOUISIANA: in low pine barrens near Mandeville, St. Tammany Parish, May 1, 1893, *Langlois* (G, Mo, US); in cut-over pines four miles west of Hammond, Tangipahoa Parish, *Trotter & Chilton*, no. 141 (La); New Orleans, *Drummond*, no. 414 (G); in low prairies, Pointe aux Loups, Acadia Parish, Sept. 17, 1894, *Langlois* (CU, US); wet prairies, Sulphur, Calcasieu Parish, *Palmer*, no. 7712 (CA, P, US). TEXAS: along road on dry sandy soil, West Orlando, Orange Co., Apr., 1936, *Uphof* (CU); bogs, Hempstead, Waller Co., *Hall*, no. 716 (G, Mo, NY, US); San Antonio, Bexar Co., Sept. 20, 1891, *Plank* (NY); e. Texas, *Wright* (G); Hookley Co., *Thurow* (US). CUBA: white sand, vicinity of Los Indios, Isle of Pines, *Britton, Britton & Wilson*, no. 14175 (NY); Isle of Pines, *Taylor*, no. 59 (G, NY, US); Colpothrinax savanna, between Pinar del Rio and Coloma, Pinar del Rio, *Britton, Britton & Cowell*, no. 10083 (NY); low pinales, San Juan-Guanes, Pinar del Rio, *Wright*, no. 3400 (G); Hacienda San Julian, south of Guane, Pinar del Rio, *León & Roca*, no. 6937 (NY); moist places, Mateo

Sanchez, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17935 (NY); common, moist places near rivulets in pinelands, Herradura, Pinar del Rio, *Ekman*, no. 17719 (US). JAMAICA: in the morass, Pedro Morass, Upper Clarendon, alt. 3000 ft., *Harris*, no. 11223 (NY, US). HISPANIOLA: slightly moist places, Pimental, prov. Duarte, Valle del Cibao, Santo Domingo, *Ekman*, no. 13252 (G, US); in savanna, El Valle, Sabana de la Mar, prov. de Samana, Cordillera Central, Santo Domingo, *Ekman*, no. 15700 (NY, US).

37. R. STENOPHYLLA Chapm. Tufted: leaves filiform, strongly involute, flexuous, ascending, upper margins minutely serrulate: culms filiform, wiry, flexuous, 3.1–9 dm. tall: cymes 1–2, small, weak, lax, corymbiform, bearing only 1–5 fertile spikelets on capillary ascending to divaricate branchlets: fertile spikelets ovate to lanceolate in outline, usually 1-flowered, 1-fruited, 3–5 mm. long, remote; sterile spikelets frequent, smaller, fusiform: scales lanceolate, pale, tightly imbricate: bristles 6, delicate, darker than the achene, with few antrorse serrulations, unequal in height, shorter than or exceeding the tubercle: achene obovoid, strongly biconvex, with surface transversely ridged, cancellate, pale, 1–1.3 mm. wide, 1.3–1.5 mm. long, with two small whitish ascending tongues of spongy tissue 0.4 mm. in height, pushed out on either side at the base: tubercle compressed, deltoid-acuminate, 0.8–1.4 mm. long. PLATE 828, FIGS. 5A and 5B; MAP 41.—Fl. So. U. S. 525 (1860); Small, Fl. 198 (1903) and Man. 186 (1933); Britton, Trans. N. Y. Acad. Sci. xi. 92 (1892), excl. syn. *R. tenuifolia* Griseb.—Infrequent in swamps or boggy ground, often in pine woods, Coastal Plain of the Carolinas, northwest Florida and Alabama. NORTH CAROLINA: boggy ground ca. 3 miles north of Hampstead, Pender Co., *Blake*, no. 11906 (G, US). SOUTH CAROLINA: Aiken, Aiken Co., July, 1866, *Ravenel* (G, NY). FLORIDA: Apalachicola, Franklin Co., *Chapman* (NY); low grassy pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 4479 (US); swamp near Argyle, Walton Co., *Curtiss*, no. 5945 (G, NC, NY, US); fertile pine woods, Walton Co., *Curtiss*, no. 3174 (CU, P, US); Warrington, Escambia Co., *Tracy*, no. 8613 (G, NY, US). ALABAMA: Great Bog, Mobile Co., July, 1889, *Mohr* (US); *Bigelow* (G).

In contrast to *R. rariflora* (Michx.) Vahl, which it closely resembles, *R. stenophylla* has pale lanceolate scales with acute tips which, in the fertile spikelets, are closely imbricated about the solitary achene. A number of spikelets are characteristically erect, sterile, and fusiform. The scales of *R. rariflora*, on the other hand, are castaneous, broadly ovate, rounded or obtuse at the tip. Frequently the 2–several-flowered spikelet of the

latter matures 2–3 achenes which, during growth, cause the scales to separate. Unlike the condition in *R. stenophylla*, the spikelets of *R. rariflora* are usually fertile and distant on wiry capillary pedicels.

Two sheets of *R. stenophylla* from Chapman's Herbarium (both of which are now at the National Herbarium, no. 968501 and Biltmore Herbarium, no. 4479) have specimens the spikelets of which are comparatively numerous and more than 1-flowered. However, none of these spikelets have mature achenes, and, although they may have been merely immature when collected, there is also the possibility that they are pathological.

Series 7. **Cernuae,** ser. nov. Plantae valde caespitosae saepe depressae: basibus saepe densis fibrillosisque: foliis setaceis saepe crispis vel latis planis subcoriaceis: cymis parvis ovoideis capitatis vel spiciformibus vel leviter patentibus corymbiformibus: spiculis monocarpis: squamis saepe pallidis; apicibus saepe obtusis: setis antrorse serrulatis vel laevibus: achaenio parvo subtiliter ruguloso vel rugoso nitido et fusco vel castaneo vel valde corrugato et pallido.

Small plants (with exception of *R. nipensis*) growing in exsiccated locations, such as rocky crevices of stream-beds and dry pine barrens, mostly restricted to the mountains of eastern Cuba. Strongly caespitose, often depressed: bases often dense, occasionally fibrillose, due to the fraying out and the persistence of the fibro-vascular strands of the old cauline leaves: leaves filiform, setaceous, often curling, or broad, flat and subcoriaceous with the upper surfaces exasperate or pruinose: cymes small, ovoid-capitate, spiciform or weakly corymbiform: spikelets 1-fruited: scales often pale, with obtuse apices, frequently short, leaving the upper portion of the achene and tubercle exposed: bristles 6, extremely fine, weakly ascending; antrorse serrulations sometimes imperceptible: achenes small, their surfaces finely rugulose, glossy dark brown to castaneous and rugose, or pale and heavily corrugate: tubercle compressed, deltoid.—*Rhynchospora*, Series B. *Diplostyleae*, Sect. 5. *Glaucae* Clarke in Urban, Symb. Ant. ii. 106 (1900), in part.

Key to Species in Series Cernuae

a. Inflorescence of 1–3 loosely spiciform cymes or a solitary (rarely 2) ovoid capitulum; spikelets sessile; bases of the caespitose tufts often densely fibrous . . . . *b.*

b. Radical leaves 1.5 (rarely)–3 mm. broad, revolute, short, spreading; upper surfaces pruinose . . . . . 38. *R. pruinosa.*

b. Radical leaves capillary or if 1 mm. wide flat, attenuate, approximating the culm in length, ascending; upper surfaces smooth . . . . *c.*

c. Inflorescence loosely spiciform; spikelets erect to ascending; leaves capillary . . . . *d.*
d. Plants forming depressed tufts; bases hard, fibrous; leaves short, 0.6 dm. in height or less, circinately coiled; culms 0.2–0.9 dm. tall; achene obovate, 1 mm. long . . . . . 39. *R. crispa.*
d. Plants forming erect tufts; bases not fibrous; leaves 2 or more dm. in height, sinuously ascending to erect; culms 2–3.3 dm. high; achene slenderly obovate, 1.3–1.4 mm. long . . . . . 40. *R. Shaferi.*
c. Inflorescence of 1–2 dense, ovoid capituli; spikelets erect, divergent and reflexed, the lowermost nodding in *R. cernua;* leaves filiform to 1 mm. wide . . . . *e.*
e. Leaves 1 mm. wide, ascending, attenuate, approximately 3.5 dm. in length, nearly equalling to exceeding the culm; capitulum solitary; spikelets ascending to divaricate, occasionally reflexed; achene elliptic-ovoid, 0.8–0.9 mm. wide, 1.3–1.4 mm. long . . . . . 41. *R. nipensis.*
e. Leaves filiform, curling, short, 0.15–0.8 dm. in length, less than ½ the height of the culm; capituli 1–(rarely)2; spikelets erect to nodding on short curved pedicels; achene obovoid, 0.8 mm. wide, 1 mm. long . . . . . 42. *R. cernua.*
a. Inflorescence consisting of a terminal, small, spreading cyme and 1–4 lateral cymes; or, if cymes are poorly developed, some of the spikelets pedicellate; bases of the caespitose tufts not fibrous . . . . *f.*
f. Mature achenes and bristles pale, the former flattened, corrugate and stipitate . . . . *g.*
g. Plants forming depressed tufts; culms 1–1.5 dm. tall, weak; scales whitish; achene 0.7 mm. wide, 1.2 mm. long; bristles shorter than the achene . . . . . 43. *R. depressa*
g. Plants forming erect tufts, not depressed; culms 2.4–4.4 dm. tall, slenderly erect; scales light brown; achenes 0.7–0.9 mm. wide, 1.3–1.4 mm. long; bristles exceeding the tubercle . . . . . 44. *R. tenuifolia.*
f. Mature achenes and bristles castaneous to dark brown, the former strongly biconvex to plano-convex, finely to obscurely rugulose, not conspicuously stipitate . . . . *h.*
h. Radical leaves usually exasperate on the upper surface, 1.5–2 mm. wide; the short cauline leaves as broad, often divaricate; culms with rarely more than 2 nodes; achene dark brown, plumply biconvex, with the bristles equally distributed on both sides . . . . . 45. *R. scabrata.*
h. Radical leaves smooth-surfaced, 1 mm. wide, usually less; cauline leaves filiform, attenuate, ascending; culms 2 (rarely)–5-noded: achene castaneous, plano-convex, with the bristles assembled on the flat side 46. *R. Lindeniana.*

38. R. PRUINOSA Griseb. Caespitose, often depressed: basal leaves commonly short, 1.5 (rarely)–3 mm. wide, canaliculate, marginally revolute, with the roughened upper surface and the small white inclusions in many of the epidermal cells producing a silvery to rimy effect; culms triquetrous, slender, erect, 0.6–5.3 dm. high, seldom bearing more than two short divaricate leaves: inflorescence of 1–2 (rarely 3) small glomerules which are oblong-

ovate in outline, 3–6 mm. broad; the smaller axillary glomerule subexserted to exserted on a slender erect peduncle: the bract subtending the terminal glomerule occasionally setaceous and inconspicuous, but more often short and leafy: spikelets ovoid, 2–2.5 mm. long, compact, turgid, 1-fruited with the tubercle of the achene protuberant: scales suborbicular, tightly imbricate, pale: bristles 6, delicate and weakly ascending, upwardly serrulate: achene broadly obovoid, biconvex, 0.7–0.9 mm. wide, 1–1.4 mm. long, gleaming dark brown, with barely discernible rugulosities: tubercle subulate-triangular, 0.4–0.6 mm. long. PLATE 826, FIGS. 3A and 3B; MAP 42.—Pl. Wright. pars 2: 535 (1862), preprint of Mem. Am. Acad. Sci. new ser. viii. 535 (1863); Grisebach, Cat. Pl. Cub. 243 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 179 (1873), excl. syn. *R. scabrata* Griseb.; Clarke in Urban, Symb. Ant. ii. 132 (1900), excl. syn. *R. scabrata* Griseb.; Britton, Mem. Soc. Cubana Hist. Nat. ii. 198 (1916), excl. syn. *R. scabrata* Griseb.—Damp woods or thickets often bordering brooks, mountains of eastern Cuba and northern Dominican Republic. CUBA: in woods, Gato Mts., Cobre Range of Sierra Maestra, alt. 1000 m., *León, Clement & Roca*, no. 10424 (NY); in umbrosis, Loma Mensura, in cacumine montis, Sierra de Nipe, Oriente, alt. 1000 m., *Ekman*, no. 9936 (NY); road to pinal, Mayari Abajo, Aug. 6, 1860,[1] *Wright*, no. 1532 (G, type-number cited without locality by Grisebach); damp banks of stream in thickets, Sierra Nipe near Woodfred, Oriente, alt. 450–550 m., *Shafer*, no. 3438 (NY, US); Camp La Gloria south of Sierra Moa, Oriente, *Shafer*, no. 8084 and no. 8085 (NY); banks of rivulets, prope villam Monte Verde dictam, Jan.–Jul., 1859, *Wright*, no. 1532 (G, NY; type-number cited without locality by Grisebach) and no. 729 (G); *Wright*, no. 3391 (NY, US; also the number of the type-collection of *R. scabrata*). HISPANIOLA: rare, in forest, Loma Quita Espuela, prov. Duarte (formerly Pacificador), Cordillera Septentrional, Santo Domingo, alt. 800 m. *Ekman*, no. 12269 (NY).

39. R. **crispa,** sp. nov. Caespites parvos valde depressos formans; basibus saepe fibrillosis: foliis basilaribus brevibus circinnatis: culmis filiformibus flexilibus ascendentibus 0.2–0.9 dm. altis, fasciculis 1–2 rare 3 parvis laxe spiciformibus; spiculis paucis; fasciculis axillaribus minoribus gracillime pedunculatis: bracteis et squamis imis setose prolongatis: setis 6, subtilissimis inaequalibus quam achaenio saepe longioribus fere laevibus: achaenio obovoideo biconvexo transverse ruguloso pallide castaneo 0.8 mm. lato, 1 mm. longo: tuberculo anguste conico 0.6 mm. longo. PLATE 827, FIGS. 4A and 4B; MAP 43.—Wet rocks of the mountain streams, Sierra Nipe, eastern Cuba. CUBA: in wet crevices of rock subject to overflow, Arroyo del Medio above

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 295 (1905).

the falls, Oriente, Dec. 22, 1909, *Shafer*, no. 3266 (NY, TYPE); in pinetis (et carrascales) Sierra de Nipe, Oriente, July 24, 1914, *Ekman*, no. 2171 (NY); banks of upper Sojo River at 600 m. alt. Sierra de Nipe, Oriente, May, 1940, *Carabia*, no. 3731 (G); Pinal Mayari, 700 m. alt. Sierra de Nipe, Oriente, April 7, 1941, *León & Victorin*, no. 19906 (G, in part).

The Ekman sheet, no. 2171, in the Herbarium of the New York Botanical Garden bears the copied annotation "*R. cernua* Gris. det. Kükenthal, 1926." Considering the evident similarity of *R. crispa* and *R. cernua*, it is not strange that Kükenthal failed to distinguish the one from the other. Both form small depressed tufts of curling leaves (although the leaves of *R. crispa* are apparently more tightly and usually inwardly rolled), from which short, capillary, wiry culms arise. Both have characteristically pale spikelets and the stubby ovate achenes with an identical pattern of surface-elaboration. The cymes of *R. crispa*, however, are strictly elongate, and are composed of more or less distant and erect—never crowded and pendulous—spikelets. The long setose subtending bracts pass by gradations into the shorter, less strongly setose, basal scales of the spikelets proper. The upper scales of *R. crispa* appear to be acute with aristulate tips, although from the over-ripe condition of the only available specimens neither this fact, nor the degree of protuberance of the achene from the spikelet can be satisfactorily determined.

The small ovoid congested capituli of *R. cernua*, on the other hand, bear erect to pendulous spikelets, and are exceeded by only 1–2 setaceous bracts at the most, which are sharply differentiated from the poorly developed lower scales. The uppermost scales, beyond which the tubercle and the upper end of the achene protrude, are characteristically emarginate with a short central mucro.

Although the achene of *R. crispa* is of the same shape and size as that of *R. cernua*, it is exceeded by several of the slender bristles and surmounted by an elongate flattened tubercle; whereas the achene of *R. cernua* is short-bristled, with a low conic tubercle.

Shafer's sheet, no. 3266, which I am designating as the TYPE of *R. crispa*, was identified by Britton as *R. Berterii* Clarke (*R. pusilla* Griseb.); but the two species are so utterly different in all but their general size and the bleached appearance of their

spikelets that it is improbable that such a misidentification should reoccur. *R. pusilla* is a lax little plant with flat, soft-textured, spreading leaves which are rarely filiform to 2 mm. wide—very different in appearance from the thick hard-based tufts of *R. crispa* with their strictly filiform subcoriaceous and inwardly coiling leaves.

40. R. Shaferi Britt. Forming dense, upright tufts: basal leaves capillary, wiry, attenuate, flexuous, ascending; cauline leaves few, attenuate, approximating the height of the culms: culms many, capillary, wiry, flexuous-ascending, 2–3.3 dm. high: cymes solitary, small, loosely spiciform, 3–4 mm. wide, each exceeded by an upright, setaceous bract: spikelets ovoid, sessile, erect or ascending, 1–2-fruited, 2.4–2.6 mm. long; the tubercle and $\frac{1}{3}$–$\frac{1}{2}$ the achene exposed: scales broadly ovate, pale; the apex rounded, with the midrib slightly, or not at all projecting: bristles 6, not equalling the achene in height, upwardly serrulate: achene slenderly ovoid, lenticular, compressed, transversely rugulose, castaneous, 0.8 mm. wide, 1.3–1.4 mm. long: tubercle conic-subulate, compressed, 0.5 mm. high. Plate 827, figs. 2A and 2B; Map 44.—Mem. Soc. Cubana Hist. Nat. ii. 197 (1916). *R. lingulata* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 211 (1926).—Thin soil, rocks on banks of mountain streams, Sierra Nipe, eastern Cuba. Cuba: thin soil near base of mountain, Loma Mensura, Oriente, alt. 680 m., *Shafer*, no. 3797 (NY, type; US, isotype); on the edge of Arroyo Machete, Sierra de Nipe, Oriente, *Ekman*, no. 15121 (NY, this number cited by Kükenthal in type-description of *R. lingulata*); in carrascales-pinetis, Sierra de Nipe, Oriente, *Ekman*, no. 2172 (NY, US; this number cited by Kükenthal in type-description of *R. lingulata*); rocks, bank of stream, Arroyo del Medio above the falls, Sierra Nipe, Oriente, alt. 250–500 m., *Shafer*, no. 4477 (NY); carrascales at Rio Pedra, Sierra, Sierra de Nipe, Oriente, alt. 200–300 m., *Ekman*, no. 19107 (G, US), and same locality, *Ekman*, no. 10010 (G, this number cited by Kükenthal in type-description of *R. lingulata*).

41. R. nipensis Britt. Densely caespitose with thick often heavily fibrous bases: roots coarse, sparingly branched, spongy: radical leaves 1 mm. wide or less, subcoriaceous, flexuous, ascending, approximating the culms in height; the tips flat and blunt, the margins finely serrulate: culms few, slender, erect, 3–3.5 dm. high, bearing 1–2 short, blunt-tipped leaves and terminated by a small ovoid dense capitulum of spikelets: bracts few, short, filiform, divergent: fertile spikelets ovoid, 1-fruited, sessile, ascending to divergent, 2.5 mm. long; the tubercle and upper portion of the achene protruding; sterile spikelets numerous, small, fusiform: fertile scales ovate, short, with rounded

apices: bristles 6, extremely tenuous, loosely ascending, antrorsely serrulate: achene elliptic-ovoid, compressed, often slightly asymmetric, 0.8–0.9 mm. wide, 1.3–1.4 mm. long; surface dull pale brown, transversely rugulose, the rugulosities conspicuously striolate: tubercle seemingly confluent with the apex of the achene, conical-acuminate, 0.6 mm. long. PLATE 826, FIGS. 4A and 4B; MAP 45.—Mem. Soc. Cubana Hist. Nat. ii. 197 (1916), non Kükenthal. *R. fibrillosa* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 212 (1926).—Rocks bordering mountain streams of the Sierra Nipe, eastern Cuba. CUBA: rock ravine, dry but subject to overflow after heavy rain, Sierra Nipe, along trail from Piedra Gorda to Woodfred, Oriente, alt. 400–500 m., *Shafer*, no. 3103 (NY, TYPE); ad marginem fluvii Rio Piloto, Sierra de Nipe, Oriente, *Ekman*, no. 3244 (NY, cited by Kükenthal in type-description of *R. fibrillosa*); on rocks of the high cascades of Rio Piloto, Sierra Nipe, Oriente, ca. alt. 700 m., *Ekman*, no. 15173 (NY, cited by Kükenthal in type-description of *R. fibrillosa*); in rock fissures, carrascales at Rio Piloto, Sierra de Nipe, ca. alt. 375 m., *Ekman*, no. 19147 (G, US; cited by Kükenthal in type-description of *R. fibrillosa*).

42. R. CERNUA Griseb. Depressed, the basal leaves forming dense curly tufts with more or less fibrous bases: leaves filiform, setaceous, wiry, sparingly serrulate, much shorter than the culms: culms filiform, erect, 1–2-leaved, 0.4–2.5 dm. high: inflorescence 1 (rarely 2) small, ovoid capituli 3–4 mm. wide; lateral capituli exserted on long filiform ascending peduncles: spikelets ovate, 1.5–2 mm. long, subsessile, erect to pendant, 1-fruited; the achene and tubercle protruding: scales obovate, notched at the apex, with the midrib slightly prolonged, stramineous to whitish: bristles 6, upwardly serrulate, height variable but falling short of the achene: achene obovoid, biconvex, transversely rugulose, castaneous, 0.8 mm. wide, 1 mm. long: tubercle a stubby cone 0.3–0.4 mm. high. PLATE 826, FIGS. 2A and 2B; MAP 46.—Cat. Pl. Cub. 248 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 87 (1871) and Fl. Cub. 182 (1873); Clarke in Urban, Symb. Ant. ii. 133 (1900), excl. syn. *R. brevirostris* Griseb.[1]; Britton, Mem. Soc. Cubana Hist. Nat. ii. 197 (1916).—Open places in pineland, mountains of eastern Cuba. CUBA: pinal near Baracoa, Oriente, June 15, 1861?,[2] *Wright*, no. 3413 (G; NY, fragment from Gray Herb. This number cited by Grisebach in type-description); 1860–64, *Wright*, no. 3365 (G. This number cited by Grisebach in type-description); forming small clumps in open places, Sierra Nipe near Woodfred, Oriente,

[1] C. B. Clarke lists *R. brevirostris* in the synonymy of *R. cernua*, due to a misprint in Griseb. which gives the Wright coll. no. of *R. brevirostris* as 3414 (instead of 3410), making it the same as coll. no. of *R. cernua*.

[2] See Underwood, Bull. Torr. Bot. Cl. xxxii. 295 (1905).

alt. 500–650 m., *Shafer*, no. 2995 (NY, in part); same locality, *Shafer*, no. 3048 (NY, US); on bank of stream, Camp La Gloria, south of Sierra Moa, Oriente, *Shafer*, no. 8218 (NY); banks of small stream, Aserrio de Moa, Oriente, *León*, no. 20254 (G).

On a basis of his new species, *R. cernua*, Grisebach[1] drew up the section *Microchaeta* to contain those species which possessed tripartite styles. However, the specimens of *R. cernua* which I have examined have the typically bifid styles. Grisebach's description was probably based upon an anomalous specimen with a tricarpellary gynoecium, a condition which occurs sporadically throughout the Section *Eurhynchospora*.

43. R. **depressa** (Kük.), stat. nov. Growing in depressed tufts: leaves filiform, canaliculate and wiry, erect or somewhat arching with the apices rounded and sparingly serrulate: culms wiry-filiform, subterete or flattened, 1–1.5 dm. high, with 1–2 nodes towards their apices; cymes 1–2, strictly ascending; the terminal cyme limited to 1–2 branchlets each of which bears either a pair of spikelets, the one subsessile, the other slenderly pedicellate, or a central sessile and two lateral pedicellate spikelets; lateral cymes smaller, exsertly pedunculate, erect: bracts attenuate, setaceous, paralleling the culm, serrulate: spikelets 2.2 mm. long, erect, approximate, sessile or slenderly pedicellate, 1-fruited, with the tubercle of the achene slightly protuberant: scales ovate, with the midrib extended slightly from a rounded, emarginate apex, papery, whitish, flecked with cinnamon toward the apex: bristles 6, shorter than the achene, with the fine upward serrulations somewhat prolonged and silvery toward the bases: achene slenderly obovoid, lenticular, biconvex, 0.7 mm. wide, 1.2 mm. long, corrugate with fine longitudinal striae, yellowish-brown: tubercle narrow-based, pike-like, 0.4 mm. long, pale, scurfy. Plate 826, figs. 1A and 1B; Map 48.—*R. Lindeniana* Griseb. ? var. *depressa* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 211 (1926).—Along mountain brooks, eastern Cuba. Cuba: ad marginem rivuli, Minas de Iberia (a Taco Bay), Oriente, *Ekman*, no. 3808 (NY, US. This number cited by Kükenthal in type-description of *R. Lindeniana* var. *depressa*).

R. depressa was described by Kükenthal in 1926 as a provisional variety of *R. Lindeniana* Griseb. Following the brief description the author stated that the specimens at hand were over-ripe and did not permit of a more reliable diagnosis. I have examined two sheets of the original collection, and, after careful comparison of these with specimens of *R. Lindeniana*,

[1] Cat. Pl. Cub. 248 (1866).

believe that Kükenthal's variety is not conspecific with Grisebach's plant. The matted, depressed habit, emphasized by the name, and the dense wiry filiform leaves distinguish the former from both *R. Lindeniana* var. *typica* and var. *bahamensis* (Britt.) Gale.

Most fundamental, however, are the differences of inflorescences and achenes. In *R. depressa* the cymes are of few spikelets, delicate, strictly ascending, and the scales are silvery white, flecked with cinnamon, emarginate, with short mucronulate tips. The cymes of *R. Lindeniana*, however, are congested, often irregularly corymbiform, and the scales, although often marginally bleached, are definitely castaneous to dark brown, with rounded or acute apices. The achene of *R. Lindeniana* is ovate to oblong-ovate in outline, plano-convex, indistinctly to finely rugulose, and a glossy dark brown at maturity. The base of the tubercle includes the summit of the achene. The achene of *R. depressa*, however, is obovate and so flattened as to be only slightly biconvex; its surface is banded by a few pale yellowish-brown corrugations. The narrow base of the tubercle of *R. depressa* does not include the summit of the achene, and extends to form a small pike-like projection.

The type-locality, Taco Bay, Oriente, tends to strengthen the argument for the specificity of *R. depressa*, for the high rate of endemism in this province is well-known.

44. R. TENUIFOLIA Griseb. Tufted: basal leaves filiform to 1 mm. wide, short, often curling, triquetrous and sparingly serrulate at the tips: culms filiform, loosely ascending, leafy, 2.4–4.4 dm. high: cymes 2–3, 6 mm. wide or less; the filiform branches erect, approximate, with few spikelets; lateral cymes distant on subexserted peduncles, the lowermost not far from the base of the culm: spikelets lanceolate-acuminate in outline, 3.5–4.5 mm. long, 3-flowered, 1-fruited, erect on slender pedicels: scales slenderly ovate, acute, light brown, papery, loosely imbricate, promptly caducous: bristles 6, pale, extremely delicate, ascending, heavily and upwardly serrulate, exceeding the tubercle: achene slenderly oblong-ovate, strongly flattened, broadly and heavily corrugate with fine longitudinal striae, pale, frequently dark brown in the narrow interstices between the corrugations, conspicuously stipitate, 0.7–0.9 mm. wide, 1.3–1.4 mm. long: tubercle attenuate-subulate, pale, 0.7–0.9 mm. high. PLATE 827, FIGS. 1A and 1B; MAP 47.—Cat. Pl. Cub. 244 (1866); non *R. tenuifolia* Benth. (1878); C. Wright in Sauvalle, Anal. Acad. Ci.

Habana, viii. 86 (1871) and Fl. Cub. 181 (1873). *R. capillacea* sensu Boeckeler, Flora, lxiv. 78 (1881), non Torrey. *R. stenophylla* sensu Britton, Trans. N. Y. Acad. Sci. xi. 92 (1892), in part, non Chapman; Britton, Mem. Soc. Cubana Hist. Nat. ii. 200 (1916), non Chapman. *R. stenophylla* sensu Clarke in Urban, Symb. Ant. ii. 130 (1900), excl. syn., non Chapman. *R. stenophylla* Chapm. var. *albescens* Kükenthal, Fedde Rep. Spec. Nov. xxiii. 211 (1926).—River-banks and moist open woodlands of northwestern Cuba. CUBA: in dense tufts, banks of rivulets San Marcos, jurisdiccion Bahia Honda, Pinar del Rio, Apr. 17, 1863?[1] *Wright*, no. 3393 (NY: US, without locality. This number cited by Grisebach in type-description.)[2]; 1865, *Wright*, no. 313 and no. 315 (NY); in cuabales, Minas, Habana, *Ekman*, no. 13138 (NY); Coca Hill, Campo Florido, Havana, *León*, no. 4733 (NY); in a clearing of a wood, Loma de la Pita, San Miguel de Casanova, Havana, *León*, no. 11547 (NY); very sterile locality, in cuabales towards Canasi, Ceiba Mocha, Matanzas, *Ekman*, no. 18597 (US); Guabal del Espinal south of San Jose station, Matanzas, *León & Roig*, no. 4142 (NY).

Grisebach followed the original description of *R. tenuifolia* with the citation of the Wright numbers 3392 and 3393. The only sheet of number 3392 which I have seen is at the Gray Herbarium. On it are mounted three specimens; the central and largest one is *R. setacea* which Grisebach mentions as growing with *R. tenuifolia*. The other two specimens, which have filiform leaves and culms, are *R. Lindeniana*, easily distinguished from *R. tenuifolia* by the finely rugulose rather than deeply rugose achene.

According to Grisebach, *R. tenuifolia* occurs in both eastern and western Cuba. However, the specimens which I have seen come exclusively from the western half of the island, that is, if the memorandum on Wright's no. 3393 in the Herbarium of the New York Botanical Garden can be taken to apply also to no. 3393 in the National Herbarium. However, the misidentified no. 3392 at the Gray Herbarium is from the vicinity of Baracoa, Oriente, suggesting the possibility that, if the sheet of no. 3392 which Grisebach saw was similarly mixed, the inclusion of eastern Cuba in the range of *R. tenuifolia* is erroneous.

R. tenuifolia Griseb. is the basis of the reports of *R. stenophylla* Chapm. from the West Indies. Although *R. tenuifolia* is very

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii 297 (1905).

[2] The sheet bearing numbers 3393 and 3392 at the Gray Herbarium consists of two specimens of *R. Lindeniana* Griseb. and one of *R. setacea* Vahl.

like Chapman's species in appearance, both having the caespitose habit, filiform leaves and culms, and small, weakly corymbose cymes of pale pedicellate spikelets, the organization of the spikelets and the appearance of the achenes are strikingly dissimilar. The spikelet of *R. tenuifolia* is 3-flowered, the lowest floret not maturing and the upper remaining rudimentary. The solitary achene, during its growth, forces apart the rather loosely imbricated, promptly caducous scales. The achene itself is slenderly oblong-ovate in outline, strongly flattened, pale, and broadly and heavily corrugate with the cancelli reduced to very fine longitudinal striae. Frequently the narrow interstices between the corrugations are dark brown, the tubercle narrowly attenuate-subulate, and the bristles extremely delicate (as is true in general of the Series *Cernuae*) pale and heavily serrulate.

The spikelet of *R. stenophylla*, however, is usually 1-flowered (rarely 2–3). The solitary achene is tightly enclosed by the persistent scales. The achene, unlike that of *R. tenuifolia*, is ovoid, prominently biconvex, and traversed by abrupt ridges between which occur the oblong cancelli. The surface is uniformly pale, except for two small tongues of whitish spongy tissue which occur, one on either side, at the base. The tubercle is triangular, and the bristles, which are heavier than those of *R. tenuifolia*, are only sparsely serrulate.

45. R. SCABRATA Griseb. Caespitose: basal leaves tufted, 1.5–2 mm. wide, short, with obtuse to acute tips; margins serrulate; upper surfaces smooth to exasperate; cauline leaves few, short-bladed, ascending to divaricate: culms obscurely triquetrous, slender, flexuous, erect, 2.3–3.8 cm. high: cymes 2–4, corymbiform, small (0.8–1 cm. wide), congested; more loosely organized cymes occurring on later-formed shorter culms; lateral cymes on included peduncles: spikelets ovoid, 3–3.5 mm. long: scales ovate to lanceolate, tightly imbricate, pale to castaneous, papery: bristles 6, extremely delicate, weakly ascending, upwardly serrulate, falling short of the tubercle: achene ovoid-ellipsoid, biconvex, gleaming dark brown, transversely rugulose, 0.9–1 mm. wide, 1.4 mm. long: tubercle attenuate-subulate, whitish, 0.9–1 mm. long.

45a. Var. **typica.** Basal leaves obtusely tipped, 1.5–2 mm. wide; upper surfaces exasperate: scales pale, concealing the tubercle. PLATE 827, FIGS. 3A and 3B; MAP 50.—*R. scabrata* Griseb. Cat. Pl. Cub. 243 (1866). *R. Randii* Britt. Mem. Soc. Cubana Hist. Nat. ii. 198 (1916).—Moist, shaded spots, moun-

tains of eastern Cuba. CUBA: pinal of Monte Libano, Oriente, Oct. 7, 1861,[1] and pinal of Mayari, July 24, 1860,[2] *Wright*, no. 3391 (G; NY, US, without locality, this TYPE-NUMBER cited without locality by Griseb.); shaded bank of small stream, Sierra Nipe near Woodfred, Oriente, *Schafer*, no. 3077 (NY, type of *R. Randii* Britt.); Sierra de Nipe, Oriente, *Carabia*, no. 3608 (G); Pinal Mayari, East of Loma Mensura, Sierra de Nipe, Oriente, *León & Victorin*, no. 19934 (G); open pineland, La Casimba, Sierra de Nipe, Oriente, 700 m. alt. *León & Alain*, no. 19241 (G).

Since the publication of Sauvalle's Flora Cubana in 1871, *R. scabrata* has been considered synonymous with the earlier *R. pruinosa* Griseb. This confusion may have had its origin in an unfortunate mixture of both species within the type-material (*Wright*, no. 3391) of *R. scabrata;* for one of Wright's specimens of this number, at the National Herbarium, is undoubted *R. pruinosa*, label and citations to the contrary notwithstanding. And possibly the perpetuation of the confusion may have been due to the superficial similarity existing between the two species. Both are caespitose, often depressed, with a tuft of coarse, flat, basal leaves which are subject to degrees of the same peculiar roughness, and from which arise the slender, triquetrous culms.

The similarity ends, however, with the inflorescence. The cyme of *R. scabrata*, although small, is spreading and corymbiform, and the scales cover the tubercle or, in the case of var. *laevifolia*, the tubercle protrudes but does not extend beyond the lanceolate scales. The cyme of *R. pruinosa*, on the other hand, is glomerulate, ovoid-oblong in shape, and so congested as to simulate a small spike; while the characteristic suborbicular scales of the spikelet are exceeded by the wholly exposed tubercle. Then, too, the pronounced transverse rugulosities on the achene of *R. scabrata* are not at all like the fine almost indistinct sculpturing on the achene of *R. pruinosa*.

Britton apparently followed previous opinion in reducing *R. scabrata* to the synonymy of *R. pruinosa* and, accordingly, the Wright sheet, no. 3391, at New York bears his annotation "*R. pruinosa*." However, for identical material, also collected in Oriente, Britton published the name *R. Randii* which, now that *R. scabrata* is given rightful recognition, becomes a synonym of that species.

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 296 (1905).
[2] See Underwood, loc. cit. 295.

45b. Var. **laevifolia,** var. nov. Foliis basilaribus acuminatis, 1.5 mm. latis, supra laevibus vel minute granularibus; squamis castaneis; tuberculis squamas superantibus. MAP 51.—Mountains of eastern Cuba. CUBA: moist places, side of trail, Sierra Nipe, along trail Piedra Gorda to Woodfred, Oriente, Dec. 8, 1909, *Shafer*, no. 3098 (NY, TYPE).

The leaves of var. *laevifolia* and var. *typica* are short, approximately 1.5 mm. wide, and basally tufted—identical except in one detail: whereas those of the latter have the peculiar exasperate upper surface, from which the specific name *scabrata* derives, those of the former are smooth or only minutely granular.

It is notable that the achenes of both var. *laevifolia* and var. *typica*, although inseparable, are, at best, very similar to those of *R. Lindeniana*. Possibly the one specimen by which var. *laevifolia* is typified is the result of hybridization between the two very closely related species.

46. R. LINDENIANA Griseb. Densely caespitose: leaves lax, setaceous, 1 mm. wide or less, flat, marginally scabrous toward the often rounded apices; cauline leaves long-attenuate, erect: culms obtusely trigonous to subterete, slender to filiform, flexuously ascending, sometimes weak, 1.5 (depressed)–7 dm. tall: cymes 2–5, remote, with few spikelets; uppermost cyme small, congested, corymbiform, with many of the spikelets undeveloped and sterile; lowermost cyme not far from the base of the culm, loosely ascending; axillary bracts slender, equalling or exceeding the height of the cymes: spikelets ovoid to rotund, 2–3.2 mm. long, 1–3-flowered, 1-fruited; the tubercle protruding: lower scales mucronate; upper scales acute to obtuse, papery, castaneous to ferruginous: bristles 6, extremely fragile, weakly ascending, upwardly serrulate, assembled on the flat side of the achene: achene ovate to oblong-ovate in outline, plano-convex, 0.7–0.9 mm. wide, 1.1–1.4 mm. long; surface indistinctly rugulose, glossy, castaneous: tubercle triangular-acuminate or sometimes prolonged and subulate, compressed, whitish, 0.8–1 mm. high.

46a. Var. **typica.** Spikelets ovoid, 3–3.2 mm. long, with the tubercle protruding: scales castaneous, acute: achene ovate in outline, 0.7–0.9 mm. wide, 1.2 (rarely)–1.4 mm. long; tubercle prolonged, subulate, 0.8–1 mm. high. PLATE 827, FIGS. 5A and 5B; MAP 52.—*R. Lindeniana* Griseb. Cat. Pl. Cub. 244 (1866); Clarke in Urban, Symb. Ant. ii. 126 (1900), in part var. *bahamensis;* Britton, Mem. Soc. Cubana Hist. Nat. ii. 196 (1916); Kükenthal, Fedde Rep. Spec. Nov. xxiii. 211 (1926).—Moist woodland in western and eastern Cuba. CUBA: low woods bordering manglares, Toscano, Pinar del Rio, July 29, 1863?[1],

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905).

Wright, no. 3393[1] (G, in part); 1843–44, *Linden*, no. 1945 (G, ISOTYPE; NY, drawing of no. 1945 from Mus. Bot. Berol. with data "Mt. Lebanon sur les roches endroits couverts alt. 600 f. v. 1844 leg. Linden")[2]; moist bank of trail, Sabanilla to Yamuri Arriba, Oriente, *Shafer*, no. 8428 (NY); Yamuri Arriba to Bermejal, Oriente, *Shafer*, no. 8455 (NY, US); Camp la Gloria, south of Sierra Moa, Oriente, *Shafer*, no. 8086 (NY); Baracoa to Florida, Oriente, *Shafer*, no. 4328 (G, NY, US).

46b. Var. **bahamensis** (Britt.), stat. nov. Similar to var. *typica* in habit, but the spikelets more nearly rotund, 2–2.4 mm. long, with tubercle and achene protruding: scales often ferruginous, usually white-margined; the uppermost blunt: achene oblong-ovate in outline, 0.8 mm. wide, 1.1–1.2 mm. long: tubercle triangular-acuminate, 0.5–0.7 mm. long. PLATE 827, FIG. 5C; MAP 53.—*R. bahamensis* Britton, Torreya, xiii. 217 (1913); Britton, Mem. Soc. Cubana Hist. Nat. ii. 198 (1916); Britton & Millspaugh, Bahama Fl. 55 (1920); Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 105 (1923).—Open to shady brook-margins and damp slopes of the Bahamas, eastern and western Cuba, eastern Hispaniola and Puerto Rico. BAHAMAS: along path in coppice, Soldiers Road, New Providence, *Britton & Brace*, no. 588 (NY, TYPE of *R. bahamensis*); vicinity of Blue Hills, New Providence, *Wilson*, no. 8241 (NY, US); mudholes of mangrove swamp, Deep Creek, Andros, *Brace*, no. 5195 (NY). CUBA: in cuabales, Loma de Cajalbana, Pinar del Rio, *Ekman*, no. 12710 (G); dry open place, Loma Pelada de Buena Vista, Cayajabos, Pinar del Rio, alt. 400 m., *León*, no. 13797 (NY); bushy savanna near Loma de la Pita, San Miguel de Casanora, Havana, Dec. 6, 1923, *León* (NY); in humidis, secus Rio Piedra, Sierra de Nipe, Oriente, *Ekman*, no. 1796 (G, NY). HISPANIOLA: very steep open mountainside, M. Bonpere, Gros-Marne, Massif du Nord, Haiti, *Ekman*, no. 4959 (G, NY, US). PUERTO RICO: rocky slopes, Maricao to Monte Alegrillo, alt. 650–750 m., *Britton, Stevens & Hess*, no. 2552 (NY); Rio de Maricao, *Hess*, no. 559 (NY).

The specimens of *R. Lindeniana* which I have studied fall into two groups. That to which the Gray Herbarium isotype, *Linden*, no. 1945, belongs, I am designating as var. *typica*. The other group, var. *bahamensis* (Britt.), includes Britton's species *R. bahamensis*.

Extremely diverse in habit, both varieties range from subdepressed, filiform tufts to robust caespitose clumps. The spikelets

[1] This is the type-number of *R. tenuifolia* C. Wright and as such was obviously misapplied to the specimens on this sheet.

[2] "in scopulosis montis Liban." as cited by Clarke in Urban, Symb. Ant. ii. 126 (1900).

of var. *typica*, however, are ovoid, acute, 3–3.2 mm. long, and 1-fruited. The solitary achene is oblong-ovoid and slender, 1.2 (rarely)–1.4 mm. long, completely enclosed by the castaneous scales, although the tubercle may protrude.

The spikelets of var. *bahamensis*, by contrast, are nearly rotund, 2–2.4 mm. long, and often 2-fruited. Their scales are characteristically stubby and usually white-margined. Beyond them protrudes the upper portion of the ovoid achene which is 1.1–1.2 mm. long.

Series 8. **Cubenses,** ser. nov. Spiculis ovoideis apicem versus tenuiter prolongatis pedicellatis; pedicellis longis, tenuibus, divaricatis vel reflexis: squamis dense imbricatis: achaenio fusco longitudinaliter irregulariter rugoso sive contracto et transverse laevissime ruguloso: tuberculo prolongato.

Growing on damp, usually shaded hillsides, endemic in the West Indies. Coarsely caespitose: bases hard: leaves 2–4 mm. wide: culms slender, flexuous, few: cymes 2–4, compound or decompound; branchlets wiry, filiform, caducous, stiffly divaricate to reflexed, forming a globose network 2.5 cm. wide; lateral cymes on included peduncles: spikelets basally ovoid with a prolonged, acute tip, borne on long, slender, divaricate to reflexed peduncles: scales tightly imbricate: achenes dark brown to black, longitudinally wrinkled as if shrunken, transversely but slightly rugulose: tubercle prolonged.—*Rhynchospora*, Series B. *Diplostyleae*, Sect. 5. *Glaucae* Clarke in Urban, Symb. Ant. ii. 106 (1900), in small part.

Key to Species in Series Cubenses

Achene ovoid, swollen, 1.2–1.4 mm. wide, 1.4–1.6 mm. long; bristles equalling to exceeding the tubercle; species limited to Cuba.....47. *R. cubensis.*

Achene rhombic-elliptic in outline, conspicuously flattened, 1–1.2 mm. wide, 1.6–1.8 mm. long; bristles usually shorter than the tubercle; species limited to Hispaniola....48. *R. stenophylloidea.*

47. R. CUBENSIS A. Rich. Coarsely caespitose with hard bases: leaves 2–3 mm. wide, flat, attenuate, loosely ascending, with acutely triquetrous scabrous tips: culms 3-angled, slender, leafy, loosely ascending: cymes 2–4, compound or decompound, the wiry filiform, stiffly divaricate to mainly reflexed branchlets forming a globose network, 2–5 cm. wide; lateral panicles on included peduncles: bracts foliaceous: spikelets basally ovoid with a prolonged acute apex, often split open by the maturing achene, 1-fruited, 5–6 mm. long, solitary on slender divaricate to reflexed pedicels: lower fertile scale ovate-aristate, upper scale lanceolate-acuminate and tightly convolute about the prolonged tubercle,

papery: bristles 6, extremely tenuous, irregularly ascending, upwardly serrulate, equalling to exceeding the tubercle: achene ovoid, swollen, 1.2–1.4 mm. wide, 1.4–1.6 mm. long, dark brown to black, longitudinally wrinkled as if shrunken, especially toward the apex, faintly rugulose from side to side: tubercle 1.1–1.8 mm. long, whitish, encrusted at the base, abruptly narrowed, then stoutly prolonged to a blunt apex. PLATE 828, FIGS. 1A and 1B; MAP 56.—Fl. Cub. Fanerog. ii. 294 (1853); Clarke in Urban, Symb. Ant. ii. 131 (1900), in part *R. stenophylloidea* (Kük.) Gale; Britton, Mem. Soc. Cubana Hist. Nat. ii. 199 (1916), in part *R. stenophylloidea* (Kük.) Gale. *R. deflexa* Grisebach, Cat. Pl. Cub. 243 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 179 (1873).—Damp usually shaded hillsides of eastern and western Cuba. CUBA: in a low wood, north slope of Loma Pelada de Buenavista, Cayajabos, Pinar del Rio, alt. 420 m., *León*, no. 13565 (NY); La Magdalena, Cayamos, Havana, *Boker*, no. 4644 (NY); Baños de Casanova, Loma de la Pita, San Miguel de Casanova, Havana, *León*, no. 12480 (NY); Loma de la Coca, near Campo Florido, Havana, *León*, no. 2939 (NY); along brook, vicinity of Madruga, Havana, *Britton, Britton & Shafer*, no. 709 (NY); edge of creek-bank, dry open serpentine savannah, 10 kilometers west of Santa Clara, Santa Clara, *Howard*, no. 5089 (G, A); deep woods, limestone outcrop, Loma Ventana, Trinidad Mt., Santa Clara, *Howard*, no. 6533 (G, A); grassy shaded hillsides, Jucaral, Cienfuegos Bay, Santa Clara, *Britton & Wilson*, no. 5742a (NY); not uncommon in wet shaded grassy lands, Cieneguita, southwest district of Cienfuegos, Santa Clara, *Combs*, no. 419 (G, NY); Monte Verde, Oriente, Aug. 28, 1859?[1] and Mayari-Abajo, Oriente, *Wright*, no. 3399 (G. This number cited without locality by Grisebach in type-description of *R. deflexa*); in tall clumps, gorge of the Rio Yamuri, Oriente, *Shafer*, no. 7809 (NY); dry, rocky hillsides, Sierra Nipe along trail Piedra Gorda to Woodfred, Oriente, *Shafer*, no. 3315 (NY); hills about Tabajo, base of El Yunque, Oriente, *Shafer*, no. 8370 (NY); prope litus, prope Baracoa ad Navas, Oriente, *Ekman*, no. 3853 (NY).

Grisebach apparently described *R. deflexa* in ignorance of the already existing *R. cubensis* A. Rich. He cited as the type, Wright no. 3399. The Wright sheet of this number at the Gray Herbarium bears two specimens, both of which are *R. deflexa* Griseb. (*R. cubensis* A. Rich.) as labeled; but no 3399 at the National Herbarium, although similarly labeled, bears by some mischance several specimens of the utterly different *R. fascicularis* (Michx.) Vahl, var. *typica*.

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 294 (1905).

48. R. **stenophylloidea** (Kük.), stat. nov. In habit identical with *R. cubensis*, caespitose with hard bases: leaves 1.5–2.5 mm. wide, flat, long, slender, flexuous-ascending; the tips triquetrous with serrated angles: culms obtusely 3-angled, 0.3–1 m. high, lax, wiry, often extremely tenuous, with the upper of the long internodes filiform: cymes 2–3, compound to decompound, 1–3 cm. wide, loosely globose, subtended by a foliaceous bract; the wiry filiform branchlets divaricate to reflexed; lateral panicles on subexserted peduncles: spikelet 4–5 mm. long, basally ovoid with a prolonged acute apex, 1-fruited, with no trace of a succeeding rudimentary floret, solitary on slender divaricate to reflexed pedicels: lower fertile scale ovate-aristate; upper scale lance-acuminate and tightly convolute about the prolonged tubercle, papery: bristles 6, extremely fragile and tenuous, irregularly ascending, upwardly serrulate, variable in length, the tallest approximating the tubercle: achene rhombic-elliptic in outline, conspicuously flattened, longitudinally wrinkled as if shrunken, faintly rugulose from side to side, 1–1.2 mm. wide, 1.6–1.8 mm. long: tubercle slenderly conical or slightly compressed, somewhat sunken at the base, whitish, 1–1.6 mm. long. PLATE 828, FIG. 2A; MAP 57.—*R. cubensis* A. Rich., var. *stenophylloidea* Kükenthal, Fedde Rep. Spec. Nov. xxxii. 78 (1933).—Mountainsides on northern coast of Hispaniola. HISPANIOLA: edge of the Estère, Le Borgue, Massif du Nord, Haiti, Sept. 13, 1925, *Ekman*, no. 4853 (G, US); in sylvestribus ad Jamao, Santo Domingo, alt. 150 m., June 23, 1887, *Eggers*, no. 2600 (NY, US); mountainside, M. Bonpere, Gros-Morne, Massif du Nord, Haiti, c. alt. 800 m., Sept. 30, 1925, *Ekman*, no. 4958 (NY); in fruticetis ad Isabel de Torres, Apr. 23, 1887, *Eggers*, no. 1658 (NY, US).

Kükenthal described *R. cubensis* var. *stenophylloidea* of Hispaniola thus: "Corymbi perparce spiculosi, nux oblonga (haud late ovalis sicut in forma typica) enervis (non longitudinaliter striata), setae hypogynae 3 breves nucem superantes (nec 6 cum nuce aequilongae)." He concluded with "Vielleicht eine gute Art, aber das vorhandene Material reicht nicht aus, um diese Frage zur entscheiden."

According to this description Kükenthal's specimens differed from the material which I am designating as *R. stenophylloidea* with regard both to the bristles and the longitudinal wrinklings on the nut. It is possible, therefore, that Kükenthal's type, *Ekman*, no. 14873, which is not available at the present time, is a different entity. But the fact that this specimen came, as it did, from Hispaniola, to which island my species is apparently

limited, and had a "nux oblonga," described above as rhombic-elliptic but which is in any case larger than that of the typical *R. cubensis*, makes me suspect that the two are conspecific. Possibly three of the six extremely fragile bristles may have broken off at their bases prior to the time of Kükenthal's examination; for when this occurs it is nearly impossible to ascertain their place of previous attachment. Kükenthal's statement as to the comparative length of the bristles is inaccurate, for those of *R. cubensis* equal or even exceed the tubercle in length and are longer than the bristles of the new species. The achenes of the specimens I have examined are, in all cases, more or less longitudinally wrinkled as if shriveled. I cannot suggest why this feature should be absent on the achenes seen by Kükenthal unless they were in this respect atypical.

Series 9. **Harveyae,** ser. nov. Culmis rigide erectis: cymis rigidis vel diffuse fasciculatis vel congestis glomerulosisque: squamis pallidis vel castaneis: spiculis turgidis monocarpis: setis antrorse serrulatis: achaenio saepissime supra tumido, infra compresso fusco leviter alveolato (rare lenticulari ruguso): tuberculo conico; basi haud discoideo sed saepe in achaenii apicem intruso.

Often growing on white sandhills of the Coastal Plain from North Carolina to Florida and west to Texas; inland in the southern and midwestern states; rare in Cuba. Stoloniferous or caespitose: leaves 1.5–7 mm. wide, not filiform: culms stiffly erect: cymes stiff, diffusely fasciculate or congested and glomerulate: scales pale or castaneous: spikelets turgid, 1-fruited: bristles upwardly serrulate: achenes usually tumid above and compressed below, dark mahogany in color, lightly pitted or cancellate in a honey-comb pattern, rarely lenticular and ridged with oblong alveoli: tubercle always grayish or whitish, conical, not projecting at the base but slightly buttressed and overgrown by the summit of the achene.—*Rhynchospora* V. *Glomeratae* Small, Man. 175 (1933), in part. *Rhynchospora*, Series B. *Diplostyleae*, Divisio 5. *Eu-Rhynchospora*, Sect. iii. *Fuscae* Clarke, Kew Bull. Add. Ser. viii. 120 (1908), in part.

Key to Species in Series Harveyae

Spikelets 6–7 mm. long, remote, some if not all slenderly pedicellate; achenes large, 2.8–3.4 mm. wide, 3–4 mm. long. . 49. *R. megalocarpa*

Spikelets not exceeding 5.5 mm. in length, sessile in small compact glomerules; achenes not exceeding 2.2 mm. in width and 2.4 mm. in length.

Achene suborbicular to broadly ovate in outline, tumid above, compressed below, the entire surface mahogany-brown at maturity.
Spikelets 4–5.5 mm. long; bristles equalling ½ the achene to exceeding the tubercle; achene 1.8–2.2 mm. wide, 2–2.4 mm. long.....50. *R. Grayii.*
Spikelets 2.5–3 mm. long; bristles equalling or shorter than ½ the achene; achene 1.3–1.6 mm. wide, 1.5–1.8 mm. long
51. *R. Harveyi.*
Achene obovate, slenderly lenticular, not tumid, surface crossed by pale irregular transverse ridges.....52. *R. culixa.*

49. R. MEGALOCARPA Gray. Stoloniferous, the bases swollen and covered by short rusty imbricated scales: leaves rigid, subcoriaceous, flat, 4–7 mm. wide, becoming conspicuously channeled, then minutely serrulate on margins and keels: culm obtusely triquetrous, smooth, stiffly erect, 0.3–1 m. high: cymes 2–5, fastigiate to slightly spreading, loose; the terminal cyme 1.6–4 cm. wide, bearing less than 50 plump spikelets singly or in clusters on slender pedicels; lateral cymes on long exserted slender ascending peduncles: spikelets ovoid, plump to bursting, some if not all pedicellate and remote, mainly ascending, 1-flowered, 1-fruited, 6–7 mm. long: scales mucronulate, chestnut-brown: stamens 10–12: bristles 6–8, very tenuous and scarcely thickened at the base, brittle, upwardly hispidulous, falling short of to barely exceeding the achene: achene round-ovoid, turgid in the upper portion, compressed below, 2.8–3.4 mm. wide, 3–4 mm. long, emarginate, mahogany-brown to blackish, glossy excepting where covered with a honey-combed surface-pattern of minute, extremely shallow pits: tubercle buttressed and somewhat encrusted by the summit of the achene, conic-apiculate, grayish or often white, 0.7–1 mm. high. PLATE 829, FIGS. 1A and 1B; MAP 58.—Ann. Lyc. N. Y. iii. 208, pl. 6, fig. 16 (1835); Torrey, Ann.. Lyc. N. Y. iii. 368 (1836); Chapman, Fl. So. U. S. 526 (1860); Boeckeler, Linnaea, xxxvii. 606 (1873). *R. dodecandra* Baldwin ex Gray, Ann. Lyc. N. Y. iii. 207, pl. 6, fig. 15 (1835); Britton, Trans. N. Y. Acad. Sci. xi. 90 (1892); Small, Fl. 196 (1903) and Man. 183 (1933). *R. pycnocarpa* Gray, Ann. Lyc. N. Y. iii. 208, pl. 6, fig. 17 (1835). *Phaeocephalum dodecandrum* House, Am. Midland Nat. vi. 202 (1920).—Deep white sand-ridges of the Coastal Plain from North Carolina southward, becoming frequent on the Florida Peninsula; less common west to Mississippi and inland along the Mississippi River (one collection). NORTH CAROLINA: sand-ridge at Carolina Beach, New Hanover Co., *Godfrey*, no. 4675 (G, NC); Wilmington, New Hanover Co., *Mr. Curtis* (NY, type of *R. pycnocarpa*); near White Lake, Bladen Co., *Oosting*, no. 33630 (D); dry open sand-barrens, 14 miles southeast of Lumberton, Robeson Co.. *Wiegand & Manning*, no. 597 (G); sandy depression, Oak Island

off Southport, Brunswick Co., *Blomquist*, no. 5613 (D). South Carolina: excavated area in coarse white sandy pine barren, 5 miles south of Kingstree, Williamsburg Co., *Godfrey & Tryon*, no. 376 (CU, D, G, NY, P). Georgia: very dry sand-hills along Fifteen Mile Creek, Emanuel Co., *Harper*, no. 977 (G, NY); common, sand-scrub, Floyd's Island, Okefinokee Swamp, Charlton Co., *J. S. Harper*, no. 700 (G); very dry white sand south of open pond, Decatur Co., *Harper*, no. 1216 (G, NY, US). Florida: Fort George, Duval Co., *Dr. Baldwin* (NY, type); *Baldwin* (NY, type of *R. dodecandra*, immature; annotated by Gray); dry sandy soil near Jacksonville, Duval Co., *Curtiss*, no. 3161 (CU, D, G, P, US); in a scrub, 18 miles north of St. Augustine, St. Johns Co., *O'Neill*, no. 7688 (CU); Palatka, Putnam Co., April, 1869, *Canby* (G, NY); Gainesville, Alachua Co., April 12, 1897, *Crawford* (P); dry sand in scrub, vicinity of Eustis, Lake Co., *Nash*, no. 462 (G, NY, US); Lake Butler, Orange Co., *Beckwith*, no. 556 (US); dry pine barrens, Okeechobee Region, Brevard Co., *Fredholm*, no. 5734 (G, US); in a low pineland, Kissimmee, Osceola Co., *O'Neill*, no. 5121 (CU); scrub near Gadsen Hammock, vicinity of Winter Haven, Polk Co., *McFarlin*, no. 4741 (CA); sand-barrens, Ballast Point, Tampa, Hillsborough Co., March 28, 1923, *Churchill* (G); Dunedin, Pinellas Co., *Tracy*, no. 6995 (G, NY, US); scrub near Sebastian, Indian River Co., *Small, DeWinkler & Mosier*, no. 11120 (NY); in a scrub, 2 miles north of Ft. Pierce, St. Lucie Co., *O'Neill*, no. 7689 (CU); in a scrub, 8 miles east of Lake Placid, Highlands Co., *O'Neill*, no. 7687 (CU); sandy ridge beside stream in pineland, 6 miles east of Manatee, Manatee Co., *Oosting*, no. 170 (D); Indian Mound near Citrus Center, DeSoto Co., *Small*, no. 9914 (NY); flatwoods, Alva, Lee Co., *Hitchcock*, no. 417 (G, NY, US); sterile pine woods, Lantana, Lake Worth, Palm Beach Co., *Curtiss*, no. 5389 (G, NY, US); in scrub-land 9 miles north of Miami, Dade Co., *O'Neill*, no. 7691 (CA, CU); dry sand along the coast, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 860b (G, NY, US); Port St. Joe, Gulf Co., *Eyles*, no. 3723 (CU); in a high hammock, Pensacola, Escambia Co., *O'Neill*, no. 6091 (CU, US). Alabama: Fort Morgan, Baldwin Co., *Tracy*, no. 7684 (G, NY, US). Mississippi: Avondale, Bolivar Co., *Tracy*, no. 4840 (G, NY); moist sandy soil west of bay, Biloxi, Harrison Co., *Pennell*, no. 4388 (NY, P); Cat Island, Hancock Co., *Lloyd & Tracy*, no. 361 (NY).

R. dodecandra Baldwin, *R. pycnocarpa* and *R. megalocarpa* were simultaneously described by Gray in 1835. The type-specimen of the first was admittedly immature; that of the second only somewhat so. A year later, in his revision of the North American Rhynchospora for Dr. Torrey's[1] North Ameri-

[1] Ann. Lyc. N. Y. iii. 368 (1836).

can Cyperaceae, Gray placed *R. pycnocarpa* in the synonymy of *R. megalocarpa* with the remark: "More perfect specimens communicated by Mr. Curtis and Dr. Chapman have enabled us satisfactorily to ascertain that *R. megalocarpa* and *R. pycnocarpa* . . . are different states of the same species." He also added that: "It (*R. megalocarpa*) approaches *R. dodecandra* with which it also agrees in the prevalent number of its stamens."

Twenty-four years later Chapman, publishing his first edition of the Flora of Southern United States, reduced *R. dodecandra* to the status of a synonym under *R. megalocarpa;* and, in so doing, established a precedent for the use of the specific name, *megalocarpa.* However, in 1892, Britton[1], in his list of North American Scirpus and Rhynchospora, gave preference to the specific name, *dodecandra,* and that name has recently come into general use. I have examined the types of *R. pycnocarpa* and *R. dodecandra,* as well as that of *R. megalocarpa.* With the mass of material now available for comparison, they are unquestionably referable to one species. Applying the rules of priority, the name *R. megalocarpa,* as selected by Chapman in 1860, must be reinstated.

50. R. GRAYII Kunth. Coarsely tufted: leaves arching, flat, 2–4 mm. wide, smooth, becoming carinate; the upper margins and keel minutely serrulate; the midrib prominent: culms obscurely triquetrous, smooth, stiffly erect, 0.4–7.5 dm. tall, with elongated internodes: the terminal cyme 1–1.5 cm. wide, compounded of 1–3 glomerules of few spikelets on short, erect to spreading peduncles; lateral cymes 1–4, consisting of a single small glomerule on an exserted peduncle: spikelets plumply ovoid, compact, 2–3-flowered, 1-fruited, 4–5.5 mm. long: scales mucronate, sandy to castaneous, tightly imbricate and entire at maturity: stamens 3– (rarely)6: bristles 6, upwardly hispidulous, brittle, varying in length from equalling ½ the achene to exceeding the tubercle: achene suborbicular in outline, tumid toward the summit, with a more or less compressed base, the surface honeycombed with minute shallow pits, mahogany-brown, 1.8–2.2 mm. wide, 2–2.4 mm. long: tubercle conic-apiculate, 0.4–0.6 mm. high, buttressed and partially encrusted by the narrowed apex of the achene. PLATE 829, FIGS. 3A and 3B; MAP 54.—Enum. ii. 539 (1837); Chapman, Fl. So. U. S. 526 (1860); Small, Fl. 196 (1903) and Man. 183 (1933); Britton, Mem. Soc. Cubana Hist. Nat. ii. 197 (1916). *R. distans* Elliott,

[1] Trans. N. Y. Acad. Sci. xi. 90 (1892).

Sk. Bot. S. Car. and Ga. i. 59 (1816), non Vahl. *R. Elliottii* Gray, Ann. Lyc. N. Y. iii. 204, pl. 6, fig. 12 (1835), non Dietrich. *Schoenus distans* Muhlenberg, Descrip. Gram. 11 (1817). *Schoenus fuscus* Muhlenberg, Descrip. Gram. 6 (1817). *Phacocephalum Grayi* House, Am. Midland Nat. vi. 202 (1920). Rare in Virginia (one collection); common southward on sandy pinelands of the Coastal Plain from North Carolina to the tip of Florida and west to eastern Texas; also western Cuba. VIRGINIA: Norfolk, Norfolk Co., *Read* (P). NORTH CAROLINA: Mimnesat Beach, near Arapahoe, Pamlico Co., *Oosting*, no. 33208 (D); dry sandy soil near Wilmington, New Hanover Co., *Biltmore Herb.*, no. 239g (CU); dry sandy pine woods, 2 miles southeast of Fair Bluff, Columbus Co., *Wiegand & Manning*, no. 606 (G); pineland at Roseboro, Sampson Co., *Godfrey*, no. 5723 (G); sandhill, 12 miles north of Laurenburg, Scotland Co., *Godfrey*, no. 5044 (D, G); Southern Pines, Moore Co., May 18, 1895, *Blankinship* (G). SOUTH CAROLINA: swampy spots in sandy land along stream, sandhills north of Hartsville, Darlington Co., Mar. 20, 1921, *Norton* (NC); Florence, Florence Co., May 18, 1912, *Bartram* (P); Columbia, Richland Co., May 16, 1912, *Bartram* (P); 10 miles east of Paxville, Clarendon Co., *Godfrey & Tryon*, no. 1018 (G, NY); open, white, sandy oak-pine woods, 1 mile east of Eutawville, Orangeburg Co., *Godfrey & Tryon*, no. 834 (G, NY); sandy open pine woods near Navy Yard, Charleston, Charleston Co., *Robinson*, no. 259 (G). GEORGIA: about Augusta, Richmond Co., June 27–July 1, 1895, *Small* (NY); sandy pinelands at Magnolia Springs, Jenkins Co., *Eyles*, no. 6255 (CU); dry pine barrens near Graymont, Emanuel Co., *Harper*, no. 806 (G, NY, US); dry sand-hills along Big Lott's Creek, Bullock Co., *Harper*, no. 916 (G, NY, US); sand-hill west of Altamaha River on State Route 38, west of Ludowici, Wayne Co., *Eyles*, no. 3159 (CU); dry pine barrens near High Point, Cumberland Island, Camden Co., *Harper*, no. 1538 (G, NY, US); Havana, *Baldwin*, in Gray's handwriting (NY, TYPE); Marshallville, Macon Co., *Earle*, no. 2975 (NY); pine barren, just north of Ashim, Turner Co., *Eyles*, no. 5569 (CU). FLORIDA: dry pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 4801 (G, NY, US); sand-hills, Welaka, Putnam Co., *Laessle*, no. 19 (CU); hammock land, Ormond, Volusia Co., Apr. 11, 1904, *Fuller* (G); bayhead near Eustis, Lake Co., Feb. 4, 1893, *Holm* (G); high pineland, Inverness, Citrus Co., *O'Neill*, no. 5270 (CU); Seminole, Pinellas Co., *Tracy*, no. 7691 (G, NY); ancient sand dunes north of Kuhlman, DeSoto Co., *Small & DeWinkler*, no. 9991 (NY); sandy pine woods near Sebring, DeSoto Co., *Palmer*, no. 2743 (NY); pinelands, Ft. Lauderdale to Miami, Broward and Dade Cos., *Small, Carter & Small*, no. 3368 (NY); in dry sandy soil among palmettos, Buena Vista,

Dade Co., *Moldenke*, no. 607 (D, NY); near Tallahassee, Leon Co., summer, *Berg* (NY); dry pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 239a (G, in part; NY, US); DeFuniak, Walton Co., *Tracy*, no. 9010 (G, NY, US). Alabama: Tensaw, Baldwin Co., *Tracy* no. 8028 (G, NY, US); common in woods, Spring Hill, Mobile Co., *Bush*, no. 335 (NY, US). Mississippi: Biloxi. Harrison Co., *Baker*, no. 1129 (NY). Louisiana: *Hale* (G). Texas: Liberty, Liberty Co., Mar. 25, 1892, *Plank* (NY). Cuba: Laguna Los Indios and vicinity, Pinar del Rio, *Shafer*, no. 10820 (NY).

Gray in his monograph pointed out that Elliott's *R. distans*, as described in the Sketch of the Botany of South Carolina and Georgia, is not *Schoenus distans* Michx. on which it was nomenclaturally based. Accordingly Gray designated the former species *R. Elliottii* in commemoration of its discoverer. He then placed in its synonymy two of Muhlenberg's species, *Schoenus distans* and *S. fuscus*, with the explanation that, as the Muhlenberg Herbarium contains no specimen labeled *S. distans*, Muhlenberg probably derived his material from Elliott. *S. fuscus* Muhl., on the other hand, is represented in the herbarium by a specimen labeled "*S. fuscus* Elliott." This, Gray states, is definitely *R. Elliottii* Gray. That Muhlenberg himself apparently suspected *S. distans* and *S. fuscus* to be conspecific (and incidentally that he also perpetuated Elliott's mistaken reference to Michaux's species) is evident from his suggestion, appended to the description of *S. fuscus:* "An *S. distans* Michaux?"

The legitimate name, *R. Grayii*, came from Kunth who, in 1837, on the basis of the priority of Dietrich's *R. Elliottii* 1833, renamed the species in honor of Asa Gray.

51. R. Harveyi Wm. Boott. Caespitose: leaves flat, obscurely carinate, with upper margins finely serrulate, ascending to curly, 1.5–3 mm. wide: culms obtusely triquetrous, stiffly erect, smooth, 0.3–1.1 m. high: terminal cyme 0.8–2.2 cm. wide, usually compounded of 1–4 small glomerules on stiff ascending to spreading peduncles; lateral glomerules 1–2, usually solitary on wiry erect peduncles: spikelets ovoid, turgid, castaneous, 2-flowered, 1-fruited, 2.5–3 mm. long: scales with midribs continuing into conspicuously recurved mucros: stamens 3: bristles 6, delicate, equalling to falling short of ½ the achene, upwardly hispidulous: achene broadly ovate to suborbicular in outline, tumid above, somewhat compressed below, 1.3–1.6 mm. wide, 1.5–1.8 mm. long, rich mahogany-brown when mature; the surface honey-

combed by small shallow isodiametric pits which may be obscured, appearing as faint rugulosities: tubercle squat, conic-apiculate, 0.4–0.5 mm. long, grayish, buttressed by the narrowed apex of the achene. PLATE 829, FIGS. 2A and 2B; MAP 59.—Bot. Gaz. ix. 85 (1884); Small, Man. 183 (1933). *R. Earlei* Britton ex Small, Fl. 197, 1328 (1903) and Man. 184 (1933); Fernald, RHODORA, XXXIX, 338 (1937) and xl. 398 (1938). *R. Plankii* Britton ex Small, Fl. 196, 1328 (1903); Small, Man. 183 (1933), in syn. of *R. Harveyi* Wm. Boott. *Phaeocephalum Plankii* House, Am. Midland Nat. vi. 202 (1920). *Phaeocephalum Earlei* House, l. c.—Low or frequently dry open areas in pinelands of the Coastal Plain from southeastern Virginia to Florida and west to Texas; scattered inland stations in the coastal states, in western Tennessee, and on the lower drainage of both the Missouri and Arkansas Rivers, and on the Sabine River. VIRGINIA: argillaceous and siliceous boggy depressions about 3 miles southeast of Petersburg, at head of Poo Run, Prince George Co., *Fernald, Long & Smart*, no. 5647 (G, NY, P); pinelands at western side of Wilcox Lake, Petersburg, Dinwiddie Co., *Fernald & Long*, no. 8596 (G, in part, P); very local, open pineland near Mason's Siding, about 1 mile north of Henry, Sussex Co., *Fernald & Long*, no. 13274 (G); depression in dry open sandy pine and oak thickets near County Line, north of Emporia, Greensville Co., *Fernald & Long*, no. 8114 (G, P). NORTH CAROLINA: moist humus soil, open woodland 4 miles southeast of Wilson, Wilson Co., *Randolph & Randolph*, no. 723 (G); savanna, 1 mile east of Middlesex, Nash Co., *Blomquist*, no. 6358 (D); sandy soil, Cumberland Co., *Biltmore Herb.*, no. 239f (CU); damp sand near brook, Pinehurst, Moore Co., *Wiegand & Manning*, no. 595 (G); Winston-Salem, Forsyth Co., *Denke* in Botanical Science Series, no. 5003 (D). SOUTH CAROLINA: cart-road through pineland-clearing, 5 miles south of Andrews, Georgetown Co., *Godfrey & Tryon*, no. 1371a (G, NY); pine barren, 2 miles west of Pineville, Berkeley Co., *Godfrey & Tryon*, no. 619 (G, NY, P). GEORGIA: Marshallville, Macon Co., *Earle*, no. 2977 (NY, type of *R. Earlei*) and same locality, no. 2976 (NY, annotated as isotype of *R. Earlei*); rather dry pine barrens near Cobb, Sumter Co., *Harper*, no. 2217 (G, NY, US). FLORIDA: 1839, *Torrey* (G). ALABAMA: low pineland, Elberta, Baldwin Co., Aug. 13, 1926, *Wolf* (StB); Mobile, Mobile Co., May, 1845, *Sullivant* (G). TENNESSEE: dry hill, Henderson, Chester Co., *Bain*, no. 244 (G). MISSOURI: ferruginous sandstone glade south of Birdsong, St. Clair Co., *Steyermark*, no. 13416 (Mo). ARKANSAS: Benton Co., 1899, *Plank*, no. 29 (NY, type of *R. Plankii*); Grand Prairie, eastern Arkansas, *Harvey*, no. 2 (G, TYPE). OKLAHOMA: Sapulpa, *Bush*, no. 656 (G, Mo, NY). LOUISIANA: vicinity of Covington, St. Tammany Parish, *Arsène*, no. 11879 (US); along drain in

Seymour Prairie, north of Bastrop, Morehouse Parish, *Brown*, no. 6510 (La); long-leaf pine-hills, north of Pollock, Grant Parish, *Brown*, no. 6458 (La). Texas: sandy woods, Mineola, Wood Co., *Reverchon*, no. 2278 (Mo, NY); damp sands, Will's Point, Van Zandt Co., *Reverchon*, no. 2277 (Mo); Angelina Co., *Tharp*, no. 3056 (US); 14½ miles northwest of White Ranch, Chambers Co., *Cory*, no. 22402 (CU, G); 2 miles northwest of Benchley, Robertson Co., *Cory*, no. 21682 (CU); moist sandy soil, Kurten, Brazos Co., *Palmer*, no. 13486 (Mo); low prairie, Hempstead, Waller Co., *Hall*, no. 714 (Mo, NY, US); Alvin, Brazoria Co., Apr. 20, 1894, *Plank* (NY); in wet ditch in red sand on clay subsoil; in railroad right-of-way cut through oak woods just east of Elgin, Bastrop Co., *Innes*, no. 874 (G); ½ mile south of Kicaster School, Wilson Co., *Parks*, no. 18795 (G); Indianola, Calhoun Co., *Ravenel*, no. 139 (NY).

William Boott published *R. Harveyi* in the Botanical Gazette of June, 1884, and cited "Grand Prairie, E. Arkansas, F. L. Harvey, 1883." At the Gray Herbarium are three Harvey collections of this species from this locality. One of these is dated July, 1884, so could not have been the original material seen by Boott. The two remaining specimens are not dated; one is unnamed. The other, however, is labeled *R. Harveyi* in Watson's hand. This I take to be the type, presuming the material collected by Harvey to have been sent to Watson and finally turned over to Boott for study.

The achene of *R. Earlei* Britton ex Small has a low conic tubercle which is uplifted by the narrowed summit of the mahogany-brown achene. These characters, seen in conjunction with the general size of the achene, indicate at once the close relationship of this plant to *R. Harveyi*. Unfortunately *R. Earlei* was published in Small's Manual, and thus appeared without a word of discussion. Nor does its position between *R. Torreyana* and *R. Edisoniana* (*R. microcarpa* Baldw. ex Gray) in the text of that work give an indication that its relationship with *R. Harveyi* was appreciated. In the key, *R. Earlei* is separated from the former by the following character: "achenes transversely wrinkled" as against "achenes cancellate." However, in *R. Harveyi* the shape of the alveoli, on which the degree of wrinkling depends, is subject to considerable variation. Typically, the alveoli are shallow and isodiametric without any accentuation of the transverse walls, but occasionally they are crowded

into irregular transverse rows and take on narrowly oblong outlines, the shorter horizontal walls of which are then accentuated and appear as fine ridges. More rarely the alveoli are nearly obliterated and the surface becomes as smooth and glossy as that of the achene of *R. megalocarpa* Gray. Earle's specimen from Marshallville, Georgia, was one with a finely ridged achene, and I presume that Britton, in recognizing it as a new species, was unacquainted with the amount of variation in the achenes of *R. Harveyi.*

However, the decompound, somewhat lax cyme of *R. Earlei* does vary from the smaller, stiffly upright, capitate cyme of typical *R. Harveyi.* This larger, looser inflorescence appears to be the only possible basis for segregation. Further collections from Georgia and Florida will be necessary in order to determine whether or not plants which were the basis of *R. Earlei* should receive recognition as a variety of *R. Harveyi.*

52. R. **culixa,** sp. nov. ?Caespitosa: foliis basilaribus 2 mm. latis planis interdum brevibus et crispis; apicem versus leviter carinatis et subtiliter serrulatis; foliis caulinis brevibus: culmis triquetris gracilibus attenuatis erectis, circa 3-foliatis; internodis longis: glomerulo terminali circa 1 cm. lato; glomerulo laterali minore pedunculato; pedunculo erecto: bracteis setaceis brevibus: spiculis late ovoideis tumidis 2-floris 1-carpis 3 mm. longis dense aggregatis: squamis late ovatis, pallide castaneis dense imbricatis; apicibus fissilibus, mucronulatis: setis 6 antrorse serrulatis, achaenio duplo brevioribus aut minus; achaenio lenticulari-obovoideo biconvexo 1.2 mm. lato, 1.4 mm. longo, alveolato fusco; inter alveolas rugis transversis prominentibus pallidis: tuberculo breviter conico, interdum apiculato, 0.3 mm. alto. PLATE 828, FIGS. 3A and 3B; MAP 55.—Rare in southern Georgia and northern Florida. GEORGIA: Irby, Tift Co., Aug. 28, 1890, *Tracy,* no. 1498 (US, TYPE). FLORIDA: *Chapman* (G, in part).

The two specimens which I have designated as *R. culixa* differ from those of *R. Harveyi* Wm. Boott and *R. globularis* (Chapm.) Small, var. *recognita* Gale in the attenuate appearance of their slender culms, in the abbreviated cauline leaves and the compact, unbranched, small, terminal glomerules. Specimens of *R. Harveyi* and *R. globularis,* var. *recognita* are, when well developed, robust, with stiffly erect culms, linear-attenuate cauline leaves and usually compound, stiffly branched ultimately glomerulate cymes.

The achene of *R. culixa* combines characters of both *R. Harveyi* and *R. globularis*, var. *recognita*. It has the unmistakable grayish, squat, conical tubercle of *R. Harveyi* but the achene, like that of *R. globularis*, var. *recognita*, is obovate, lenticular, biconvex, not swollen above, and the transverse walls of the prominent alveoli are accentuated as ridges. However, unlike the ridges on the achene of var. *recognita*, those of *R. culixa* are pale, broader, and developed at the expense of the alveoli which, in the central area, have been rounded and thrown out of the orderly parallel alignment so conspicuous in the achene of var. *recognita*.

Series 10. **Globulares,** ser. nov. Culmis rigide erectis vel rare tenuibus et laxe ascendentibus: cymis saepissime rigidis, glomerulosis vel fasciculatis; cymis lateralibus pluribus: spiculis turgidis, 1–3-carpis: squamis dense imbricatis: setis antrorse serrulatis saepe achaenio duplo brevioribus: achaenio late ovato vel suborbiculato ruguloso vel valde rugoso, cancellato vel striato, emarginato.

Growing in low peaty areas, often in pineland, of the Coastal Plain; inland in the midwestern states; also in the West Indies and Central America. Habit often coarse; leaves never filiform, 1.5–5 mm. broad, often forming a coarse basal tuft: culms usually stiffly erect, rarely slender and loosely ascending: cymes glomerulate or fasciculate, usually stiff: lateral cymes several: spikelets turgid, 1–3-fruited: scales tightly imbricate: bristles upwardly serrulate, often poorly developed: achenes broadly ovate to suborbicular, rugulose to ridged (with the exception of *R. globularis* var. *pinetorum*), cancellate to striate, emarginate, compressed or swollen in the upper portion: tubercle short, basally conical.—*Rhynchospora* V. *Glomeratae* Small, Man. 175 (1933), in part. *Rhynchospora*, Series B. *Diplostyleae*, Sect. v. *Glaucae* Clarke in Urban, Symb. Ant. ii. 106 (1900), in part.

Key to Species in Series Globulares

a. Achene flat or centrally sunken; habit coarse; the basal leaves 4–5 mm. wide....*b.*
  b. Tubercle with a subulate apex rising abruptly from a pronounced basal flange; achene dark reddish-brown..53. *R. compressa.*
  b. Tubercle deltoid-apiculate, the base somewhat decurrent, not projecting; achene castaneous.....54. *R. punctata.*
a. Achene biconvex or somewhat plano-convex, castaneous; habit slender or weak; the basal leaves 4 mm. wide or less....*c.*
  c. Bristles exceeding the achene in height....*d.*
    d. Achene 1.2–1.3 mm. wide, 1.3–1.5 mm. long, the transverse ridges numerous; tubercle depressed, discoid-apiculate.....55. *R. saxicola.*
  d. Achene 0.8 mm. wide, 0.9 mm. long, the transverse ridges less than 6; tubercle deltoid-compressed.....56. *R. sulcata.*

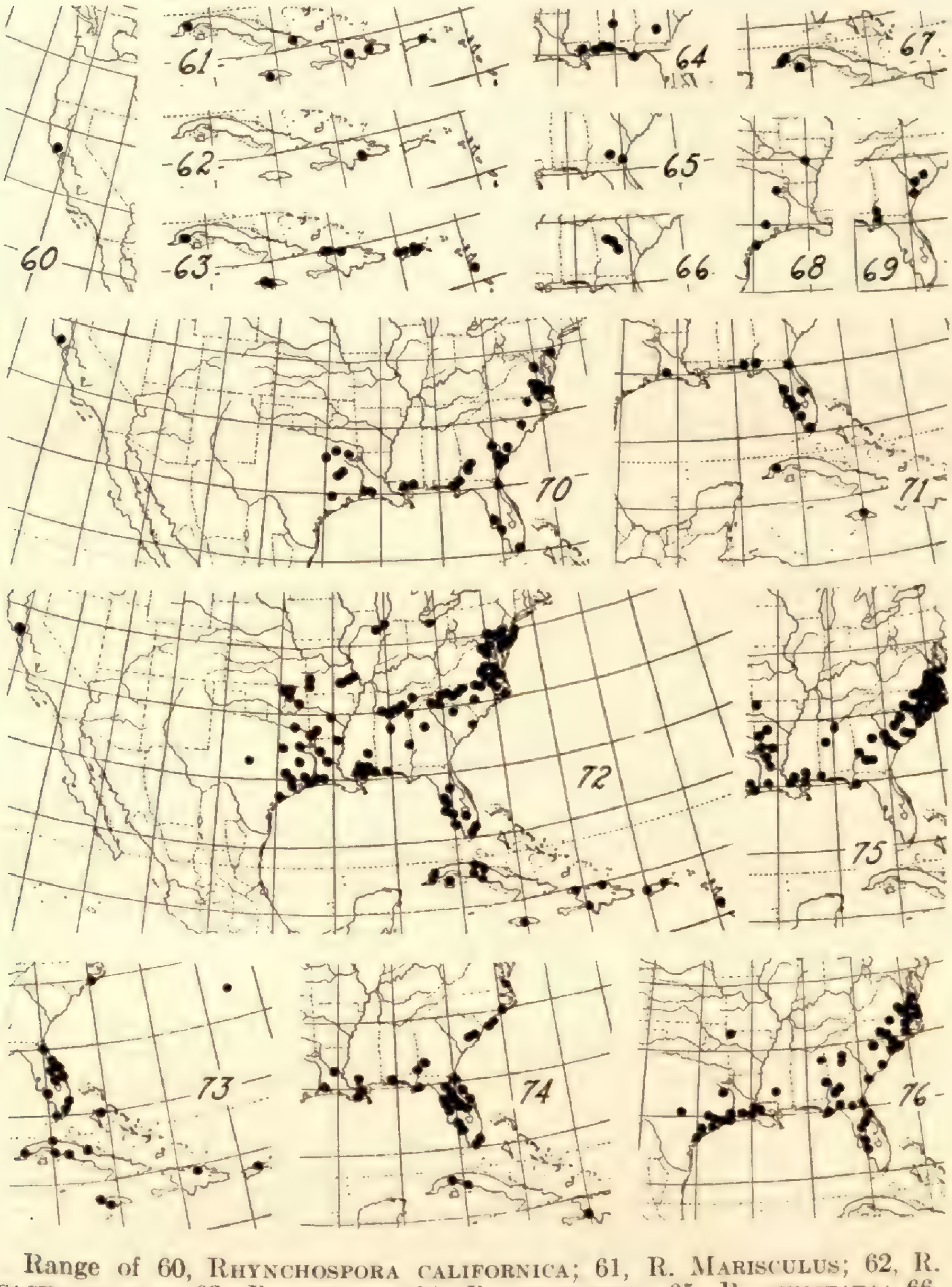
c. Bristles not exceeding ⅔ the achene....*e.*
e. Species limited to western Cuba; achene 0.8 mm. wide, 0.9 mm. long.....57. *R. Brittonii.*
e. Species continental; achene 1 mm. wide, usually wider, 1.2 mm. iong....*f.*
f. Transverse ridges widening, becoming lighter and obscuring the alveoli over the central portion of the achene; spikelets ascending, not more than 6 in small ultimate fascicles.....58. *R. obliterata.*
f. Transverse ridges not widening or becoming light-colored, the alveoli not less distinct over the central area of the achene; spikelets ascending to divergent and numerous in ultimate fascicles or glomerules 59. *R. globularis.*

53. R. COMPRESSA Carey ex Chapman. Caespitose: basal leaves flat, smooth or with margins finely serrulate, 4–5 mm. wide, forming a coarse rigid tuft: culms obtusely trigonous, stiffly erect, leafy, 6.6–9.6 dm. high: cymes 2–4, 1.8–3 cm. wide, densely bracteate, consisting of several glomerules on slender erect to spreading branchlets; lateral cymes remote, exserted on slender erect peduncles: spikelets ovoid, with a slightly irregular contour, 2–3-flowered, 1–2-fruited, castaneous, 3.5–4 mm. long: scales papery; the lowest mucronulate, the others acute: bristles 6, upwardly serrulate, stiff, rarely equalling, never exceeding, the achene: achene obovate to nearly orbicular, 1.4–1.6 mm. wide, 1.4–1.7 mm. long, characteristically flattened, often centrally depressed; the dark reddish-brown surface cancellate and transversely ridged: tubercle compressed-subulate, 0.6–0.8 mm. high, abruptly rising from a conspicuous basal collar. PLATE 830, FIGS. 1A and 1B; MAP 64.—Fl. So. U. S. 525 (1860); Small, Fl. 197 (1903) and Man. 184 (1933); Robinson & Fernald in Gray, Man. ed. 7: 199, fig. 316 (1908). *R. cymosa* var. *compressa* (Chapman) Clarke ex Britton, Trans. N. Y. Acad. Sci. xi. 91 (1892). *Phaeocephalum compressum* House, Am. Midland Nat. vi. 201 (1920).—Low pinelands and swamps, southern Georgia, Florida and west to eastern Louisiana. GEORGIA: flat pine barrens east of Ocilla, Irwin Co., *Harper*, no. 1414 (G, NY, US). FLORIDA: *Carey* (G); low pine barrens, Apalachicola, Franklin Co., *Saurman* (P); Apalachicola, Franklin Co., *Chapman* (NY). ALABAMA: Wilcox Co., May, 1841, *Buckley* (US); brackish swamps, Baldwin Co., June 15, 1893, *Mohr* (NY); Gateswood, Baldwin Co., *Tracy*, no. 8462 (G, US); low pinelands, Point Clear, Baldwin Co., May 11, 1940, *Sargent* (Sargent Herb.); Mobile, Mobile Co., May, 1845, *Sullivant* (G). MISSISSIPPI: Biloxi, Harrison Co., *Tracy*, no. 4883 (NY, US); in low pine barrens, Pass Christian, Harrison Co., June 26, 1885, *Langlois* (CU); Ocean Springs, Jackson Co., May 9, 1895, *Skehan* (G, US). LOUISIANA: vicinity of Covington, St. Tammany Parish *Arsène*, no. 11750 (NY, US).

Old records from Missouri were based on misidentifications.

54. R. PUNCTATA, Ell. Caespitose, with a large clump of coarse basal leaves: leaves 5 mm. wide, carinate, becoming triquetrous at the tip, with setaceous margins: cauline leaves short, erect: culms stiffly erect, triquetrous, smooth, approximately 7.6 dm. high: cymes 4, decompound, the stiff wiry ascending branchlets of varying lengths and terminating in small glomerules; terminal cymes 4 cm. wide; lateral cymes smaller, on long slender ascending peduncles: spikelets ovoid, 5 mm. long, approximately 4-flowered, 1–2-fruited: scales pale chestnut, frayed; the midribs of the lower scales free at their tips and slightly projecting: bristles 6, equalling ½ the tubercle in length, upwardly hispidulous, ascending: achene obovate to suborbicular in outline, extremely compressed, cancellate, with fine transverse rugulosities, pale chestnut, 1.8 mm. wide, 2.2 mm. long: tubercle deltoid-apiculate, compressed, pale, 0.9 mm. high. PLATE 830, FIGS. 2A and 2B; MAP 65.—Sk. Bot. S. Car. and Ga. i. 60 (1816); Gray, Ann. Lyc. N. Y. iii. 203, pl. 6, fig. 11 (1835); Chapman, Fl. So. U. S. 526 (1860); Small, Fl. 198 (1903) and Man. 185 (1933). *Phaeocephalum punctatum* House, Am. Midland Nat. vi. 202 (1920).—Wet pine parrens, southern Georgia and northern Florida. GEORGIA: wet pine barrens, about 1 mile southeast of Douglas, Coffee Co., *Harper*, no. 2200 (G, NY, US). FLORIDA: St. Mary's, *Baldwin* (NY); "St. Mary's & Savan," *Baldwin* (P).

55. R. SAXICOLA Small. Caespitose: basal leaves forming a coarse curly tuft; cauline leaves 1.5–3 mm. wide, harsh, mostly erect, flat, becoming trigonous near the summit; margins finely serrulate: culms triquetrous, slender, erect, short, 2.6–3 dm. high: inflorescence of 2–4 cymes; the terminal one 1.3–2 cm. wide, with a few slender erect branchlets bearing small clusters of sessile spikelets: bracts short, inconspicuous: scales tightly imbricate, castaneous; lowermost mucronate and usually split: spikelets ovoid, turgid, 3-flowered, 1–2-fruited, sessile, 3.5–4 mm. long: bristles 6, fragile, well exceeding the tubercle, upwardly serrulate: achene obovoid, compressed except for the slightly swollen region of the umbo, finely cancellate, ridged, castaneous, 1.2–1.3 mm. wide, 1.3–1.5 mm. long: tubercle depressed, conic-apiculate, with a discoid base, 0.2–0.3 mm. high. PLATE 830, FIGS. 3A and 3B; MAP 66.—Man. 185, 1503 (1933).—Granite outcrops in the Piedmont of Georgia. GEORGIA: boggy slope on south side of Little Stone Mt., DeKalb Co., *Harper*, no. 2308 (NY, TYPE; US, ISOTYPE), and no. 2309 (NY); dry thickets on flat granite rocks, 1 mile east of Logansville, Walton Co., *Pyron & McVaugh*, no. 549 (US); shallow soil about granite outcrops, 9 miles southeast of Greensboro, Greene Co., *McVaugh*, no. 5328 (USNA); shallow soil about granite outcrops, 4 miles southeast of Sparta, Hancock Co., *McVaugh*, no. 5345a (USNA).



Range of 60, RHYNCHOSPORA CALIFORNICA; 61, R. MARISCULUS; 62, R. CACUMINICOLA; 63, R. RUGOSA; 64, R. COMPRESSA; 65, R. PUNCTATA; 66, R. SAXICOLA; 67, R. BRITTONII; 68, R. OBLITERATA; 69, R. SULCATA; 70, R. GLOBULARIS, var. TYPICA; 71, R. GLOBULARIS, var. PINETORUM; 72, R. GLOBULARIS, var. RECOGNITA; 73, R. ODORATA; 74, R. MILIACEA; 75, R. INEXPANSA; 76, R. CADUCA

The habit of *R. saxicola* has little to distinguish it from that of *R. globularis* (Chapm.) Small, var. *typica*. However, its spikelets are usually a millimeter longer and tend to be erect in clusters, rather than erect to divergent in glomerules or fascicles. The most obvious character by which to separate the achene of *R. saxicola* from that of *R. globularis*, var. *typica* is, as emphasized in the key, the comparative length of the bristles. Those of *R. saxicola* are 6 in number, and, although extremely frail and apt to be broken off, do, when entire, exceed the achene and often the tubercle. Those of the former, however, rarely equal ½ the achene in height. The alveoli of *R. saxicola* also differ from the usually dull alveoli of *R. globularis*, for the former are so narrowly oblong as to appear merely as fine glistening striae running between the transverse wrinkles. The "depressed conic or disc-like tubercle", as described by Small, is not too dependable a character; for, although the average tubercle of *R. globularis* is short and conical, it may less frequently be depressed and even basally discoid.

R. saxicola is peculiar in being strictly limited, so far as is known, to margins of shallow ephemeral pools on the granite outcrops in the Piedmont of Georgia.

56. R. **sulcata,** sp. nov. Planta caespitosa: foliis 1–2.5 mm. latis laxis planis; apicibus trigonis: culmis 3.6–6.5 dm. altis gracilibus fere teretibus laxis; internodis longis: inflorescentia culmi longitudinis ¾ aequanti; paniculo terminali 2.5 cm. lato; ramulis debilibus filiformibus ascendentibus vel patulis; glomerulis terminalibus parvis; paniculis lateralibus distantibus; pedunculis brevibus exsertis ascendentibus: spiculis rotundo-ovoideis turgidis 1–6-carpis 3 mm. longis: squamis fere orbicularibus castaneis deciduis: setis 6 fragilibus, achaenio aequalibus, antrorse et minute serrulatis: achaenio parvo (0.8 mm. lato 0.9 mm. longo) subgloboso nitido castaneo profunde transverse sulcato; sulcis valde longitudinaliterque striolatis: tuberculo compresso-deltoideo albescente 0.2 mm. alto. PLATE 831, FIGS. 3A and 3B; MAP 69.—Infrequent along streams, on pond-shores, and in low places of the Coastal Plain from Southern South Carolina to northern Florida. SOUTH CAROLINA: damp soils, Santee Canal, Berkeley Co., Sept., *Ravenel* (G); sedge-meadow at Bostick Pond near Allendale, Allendale Co., Aug. 5, 1939, *Eyles*, no. 6465 (CU). GEORGIA: pond near Luciene Bay, Effingham Co., July 25, 1939, *Eyles*, no. 6378 (G, TYPE; CU, ISOTYPE); sandy shore of Open Pond, Decatur Co., Aug. 12,

1901, *Harper*, no. 1204 (G, NY, US). FLORIDA: Quincy, Gadsden Co., *Chapman* (NY, in part); Tologee Creek, in John Carey's handwriting (G).

R. sulcata is closely related to both *R. Brittonii* Gale of Cuba and *R. microcarpa* Baldw. ex Gray of the southern United States and the Greater Antilles. The danger of confusion with *R. Brittonii* is small due to the geographical separation of the two species, but the similarity in habit is so striking as to deserve a short discussion. Both species have in common slender flexuous culms which customarily bear small cymes at every node including the first. The lax branchlets in *R. sulcata* are, however, spreading to divergent so that, as a result, its panicles do not have the somewhat congested appearance of the inflorescence, with spikelets borne on the mainly ascending branchlets, of *R. Brittonii*. The achenes of *R. Brittonii* are slightly larger than those of *R. sulcata*. Both are ridged, but those of the latter more abruptly so and with the concomitant grooves deeper. Lastly, the 5–6 bristles surrounding the achene of *R. Brittonii* are short, not exceeding ½ its height; whereas the achene of *R. sulcata* is surrounded by 6 bristles which equal it in height.

R. microcarpa, on the other hand, is found within the range of *R. sulcata*, and in its smaller attenuated specimens simulates the typical habit of the latter. In *R. sulcata*, however, as mentioned above, the second, if not the first, node of the culm bears the first lateral panicle, so that the inflorescence occupies ⅔–¾ the length of the culm. In *R. microcarpa* the first, second, usually the third, and often the fourth nodes are barren, and the inflorescence occupies only the upper ¼, rarely ½ the culm. A comparison of the sculpturing on the surface of the achenes of the two species is even more conclusive, for that of the new species is emphatically ridged, whereas that of *R. microcarpa* is typically pitted, with the transverse walls only rarely accentuated so as to produce a rugulose effect.

57. R. **Brittonii,** sp. nov. Planta caespitosa: foliis 1 mm. latis aut minus, planis, apicem versus trigonis et minute serrulatis: culmis vel obtuse trigonis gracilibus vel filiformibus teretibusque, flexilibus, 2.8–5 dm. altis: paniculo terminali decomposito, leviter congesto, 0.8–1 cm. lato; ramulis ascendentibus vel divergentibus; paniculis lateralibus exsertis pedunculatis: spiculis rotunde ovoideis, turgidis, 3–5-floris, 2–4-carpis, 2–2.5 mm.

longis: squamis fere orbiculatis dense imbricatis fuscis: setis 5–6 achaenio duplo brevioribus, antrorse et minutissime serrulatis: achaenio subhemisphaerico, parvo (1 mm. lato, 1 mm. longo) inter rugas paucas profundas transversas longitudinaliter striolato: tuberculo compresso-deltoideo, 0.2 mm. alto. PLATE 831, FIGS. 2A and 2B; MAP 67.—Borders of lagoons, Isle of Pines and western Cuba. CUBA: savanna, San Pedro and vicinity, Isle of Pines, Feb. 12–Mar. 22, 1916, *Britton & Wilson*, no. 14301 (NY, US); shore of Laguna de Junco, Pinar del Rio City, Pinar del Rio, Oct. 31, 1923, *Ekman*, no. 17862 (US); lagoon in savanna, vicinity of Pinar del Rio City, Pinar del Rio, Mar. 8–15, 1911, *E. G. Britton*, no. 10023 (NY, TYPE; US, ISOTYPE); dryish sand, Laguna Jovero and vicinity, Pinar del Rio, Dec. 12, 1911, *Shafer*, no. 1090 (NY); border of lagoon, vicinity of Pinar del Rio City, Pinar del Rio, Sept. 5–12, 1910, *Britton, Britton & Gager*, no. 6946 (NY); Laguna de la Maguina, south of Pinar del Rio City, Pinar del Rio, Nov. 28, 1940, *León & Alain*, no. 19410 (G).

This species has been named in honor of Dr. NATHANIEL LORD BRITTON. It is most closely related to *R. sulcata* Gale, and the discussion of the two species follows the description of the latter.

58. R. **obliterata,** sp. nov. Planta caespitosa: foliis 1.5–2 mm. latis planis setaceis ascendentibus; marginibus sparse serratis: culmis trigonis gracilibus, 5.9–9.2 dm. altis, apicem versus flexuosis: fasciculis 2–3 decompositis corymbiformibus 2–3 mm. latis; lateralibus compositis minoribus erectis pedunculatis exsertis: spiculis ovoideis, 1–3-floris, 1–2-carpis, 3.5–4 mm. longis: squamis aristulatis, laxe imbricatis: setis 6, achaenio duplo brevioribus vel saepe rudimentariis, antrorse serrulatis: achaenio late lenticulari-obovoideo biconvexo 1.2–1.3 mm. lato 1.2–1.3 mm. longo nitido castaneo; alveolis in medio a rugis validis pallidis transversis obscuratis: tuberculo depresso apiculato 0.3 mm. alto. PLATE 830, FIGS. 4A and 4B; MAP 68.—Borders of ponds in Arkansas and southeastern Texas. ARKANSAS: borders of ponds, E. Ark.[1] July, 1884, *Harvey*, no. 12 (G). TEXAS: Cypress City, Harris Co., Aug., 1877, *Boll*, no. 793 (Mo); ponds, Hempstead, Waller Co., April 16, 1872, *Hall*, no. 709 (G, TYPE; Mo, NY, US, ISOTYPES); prairie near Indianola, Calhoun Co., May 30, 1869, *Ravenel*, no. 144 (NY, in part *R. globularis* (Chapm.) Small, var. *recognita* Gale).

The specimens of *R. obliterata* cited above were segregated from collections of *R. globularis* (Chapm.) Small, var. *recognita* Gale (*R. cymosa*). They differ in general from the latter species

[1] Located on the map as in the vicinity of Grand Prairie.

both in their cauline leaves, which are narrower and setaceous, and in their lack of a coarse, curling tuft of basal leaves. The inflorescence of *R. obliterata* is loosely fasciculate. The numerous small clusters of spikelets, each borne on a flexuously ascending branchlet, are inconspicuously bracteate. The inflorescence of *R. globularis* var. *recognita*, on the other hand, has comparatively short, stiffly erect to divergent branchlets bearing tight ultimate corymbs or glomerules which are penetrated by short stiff bracts. The lenticular achene of *R. obliterata* has a precise, broad-obovate outline. The transverse walls of the alveoli are aligned and pushed up into small ridges which, over the central portion of the achene, become conspicuously wider and paler, obscuring the alveoli. The achene of *R. globularis* var. *recognita* is by contrast irregularly obovate to suborbicular in outline, and tends to be more tumid above. Its small ridges are evenly continued across the face of the achene, and the alveoli of the central portion remain undiminished in size. The name of the new species derives from the characteristic blotting out of the central alveoli.

59. R. GLOBULARIS (Chapm.) Small. Caespitose, with a tuft of coarse often curling basal leaves: leaves 1.5–4 mm. wide, flat; the edges finely serrulate; tips triquetrous: culms trigonous to subterete, 1.4–9.2 dm. tall, robust and stiffly erect to slender, attenuate and flexuous: cymes 1–4, rarely 5; the branchlets rigid, short and spreading or contracted, terminating in capituli: spikelets broadly ovoid to nearly rotund, turgid, 1–3-fruited, 2.5–4 mm. long: scales papery, tightly involute; the lowermost suborbicular, commonly split at the apex, blunt or mucronate: bristles 5–6, not exceeding ⅔ the achene in height, upwardly serrulate: achene broadly obovoid to subglobose, tumid above, compressed below, cancellate, transversely ridged to rugulose, castaneous, 1–1.5 mm. wide, 1.2–1.6 mm. long: tubercle conical, with or without a compressed apex, 0.3–0.6 mm. high.

KEY TO VARIETIES OF R. GLOBULARIS

Achenes transversely ridged or rugulose, their cancelli oblong.
  Habit frequently depressed; branchlets of the cymes terminating in small knobby glomeruli; bracts inconspicuous; spikelets 2.5–3 mm. long; achenes 1–1.2 mm. wide, 1.2–1.3 mm. long, finely cancellate, transversely ridged to rugulose ..... 59a. var. *typica*.
  Habit robust; branchlets of the cymes usually terminating in dense glomerules; setaceous bracts conspicuous; spikelets 3–4 mm. long; achenes 1.2–1.5 mm. wide, 1.3–1.6 mm. long, coarsely cancellate to striate, transversely ridged .. 59b. var. *recognita*.
Achenes flat-surfaced except for a faintly raised isodiametric reticulation ..... 59c. var. *pinetorum*.

59a. Var. **typica.** Leaves 1.5–2 mm. wide: culms often short, but ranging from 1.4–6.8 dm. in height, slender, obtusely trigonous to subterete, often attenuate, wiry and flexuous: branchlets of the cymes terminating in small knobby capituli of 3–8 spikelets: bracts inconspicuous: spikelets 2.5–3 mm. long, 1–2-fruited: bristles 5 (rarely 6), usually less than ½ the achene in height: achene finely cancellate, transversely ridged to rugulose, 1–1.2 mm. wide, 1.2–1.3 mm. long: tubercle short, conical. PLATE 831, FIGS. 1A and 1B; MAP 70.—*R. globularis* Small, Man. 184 (1933). *R. cymosa* var. *globularis* Chapman, Fl. So. U. S. 525 (1860); Britton, Trans. N. Y. Acad. Sci. xi. 91 (1892); Small, Fl. 197 (1903); Fernald, RHODORA, xxxvii. 380, 405 (1935) and xxxix. 391, 480 (1937).—Sandy or peaty depressions from Delaware south along the Coastal Plain to the tip of Florida and west to eastern Texas; inland to the upper Sabine and the Red Rivers; also in swamps of the coastal ranges of northern California. DELAWARE: swamps, Newport, New Castle Co., July 12, 1863, *Commons* (NY). VIRGINIA: ledges along Potomac River, Great Falls, Fairfax Co., *Blake*, no. 5277 (US); low woodroad north of Savedge, Surry Co., *Fernald & Long*, no. 8121 (G, P); sandy and peaty depression (exsiccated shallow pond) about 4 miles northwest of Homeville, Sussex Co., *Fernald & Long*, no. 6071 (G, P); wet argillaceous depressions south of Petersburg, Dinwiddie Co., *Fernald & Long*, no. 8120 (G, P); peaty and argillaceous clearing about 4 miles southeast of Emporia, Greensville Co., *Fernald & Long*, no. 8122 (G, P); near Northwest, Norfolk Co., *Kearney*, no. 1536 (US); sandy barrens, Rifle Range, south of Rudy Inlet, Princess Anne Co., *Smith & Hodgdon* in Pl. Exsic. Gray., no. 625 (CU, G, NY, P, US). NORTH CAROLINA: argillaceous-siliceous clearing, 2 miles east of Conway, Northampton Co., June 14, 1939, *Godfrey*, (CU, D, G, P); open pine woods, acid soil, south of Bennett Memorial, Durham Co., *Blomquist*, no. 9799 (CU, D); damp thickety school yard, 7 miles east of Lumberton, Robeson Co., *Wiegand & Manning*, no. 614 (G). SOUTH CAROLINA: sand pit, Combahee River, south of Hendersonville, Colleton Co., *Wiegand & Manning*, no. 617 (G). GEORGIA: Smithville, Lee Co., *Earle*, no. 2979 (NY); low grounds between Millen and Ogeechee River, Burke Co., *Harper*, no. 792 (G, US); rather dry sandy roadside in pine barrens, Bullock Co., *Harper*, no. 880 (G, NY, US); margins, Bouhin's Pond, Chatham Co., *Eyles*, no. 6093 (CU); ditch along U. S. Route 17 south of Ways, Bryan Co., *Eyles*, no. 6286 (CU); dry open sink between Newton and Elmodel, Baker Co., *Eyles*, no. 7067 (Hermann Herb.). FLORIDA: near Jacksonville, Duval Co., *Curtiss*, no. 4105 (US); Manavista, Manatee Co., *Tracy*, no. 6991 (US); in moist sandy ditch along roadside, Rialto, Lee Co., *Moldenke*, no. 1011 (US); in hammocks and pine lands, Black

Point, below Cutler, Dade Co., *Small & Carter*, no. 880 (NY); Chipola River swamp, Jackson Co., *Curtiss*, no. 3 (G); swampy thicket, Washington Co., *Curtiss*, no. 3149 (CU, P, US). Mississippi: Picayune, Pearl River Co., May 24, 1940, *Sargent* (Sargent Herb.). Louisiana: in grassy soil, Covington, St. Tammany Parish, July 17, 1884, *Langlois* (CU); low prairies, Jennings, Jefferson Davis Parish, *Palmer*, no. 7624 (CA); infrequent, low prairies, vicinity of Lake Charles, Calcasieu Parish, *Mackenzie*, no. 400 (NC, NY). Texas: common in swamp, Big Sandy, Upshur Co., *Reverchon*, no. 2460 (Mo, NY); damp places, Dallas, Dallas Co., *Reverchon*, no. 3603 (G, US); wet sandy ground, Jacksonville, Cherokee Co., *Palmer*, no. 7905 (CA, Mo, P); springy places north of Palestine, Anderson Co., June 8, 1899, *Eggert* (Mo); low prairie, Hempstead, Waller Co., *Hall*, no. 712 (NY, US). California: Pitkin Marsh, 5 miles north of Sebastopol, Sonoma Co., *Howell*, no. 12678 (G).

59b. Var. **recognita,** nom. nov. Leaves 2–4 mm. wide: culms 1.5 (rarely)–9.2 dm. in height, robust, trigonous and erect to attenuate, obscurely trigonous and flexuous: terminal capituli usually heavily crowded with spikelets: the pale bracts usually conspicuous: spikelets consistently larger than those of var. *typica*, 3–4 mm. long, 1–3-fruited: bristles 5–6, ½-⅓ height the achene in length: achene coarsely cancellate to striate, transversely ridged, 1.2–1.5 mm. wide, 1.3–1.6 mm. long: tubercle 0.5–0.6 mm. high, conic to triangular, with the apex compressed. Plate 831, figs. 4A and 4B; Map 72.—*R. cymosa* sensu Torrey, Fl. N. and Mid. St. no. 1: 56 (1823) and later authors to the present; Gray, Ann. Lyc. N. Y. iii. 196, pl. 6, fig. 1 (1835); Torrey, Ann. Lyc. N. Y. iii. 364 (1836); Gray, Man. 532 (1848); Chapman, Fl. So. U. S. 524 (1860); Britton, Trans. N. Y. Acad. Sci. xi. 91 (1892), excl. syn. *R. Harveyi* Wm. Boott (*R. Harveyana* in error); Britton & Brown, Ill. Fl. i. 280, fig. 658 (1896); Clarke in Urban, Symb. Ant. ii. 129 (1900), excl. syn.; Britton, Man. 186 (1901); Small, Fl. 197 (1903) and Man. 184 (1933); Robinson & Fernald in Gray, Man. ed. 7: 199, fig. 315 (1908); Britton, Mem. Soc. Cubana Hist. Nat. ii. 198 (1916); Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 104 (1923); non Elliott. *R. gracilis* sensu Grisebach, Cat. Pl. Cub. 243 (1866), in part; C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 179 (1873), in part; non (Swartz) Vahl. *R. Torreyana* sensu Grisebach, Cat. Pl. Cub. 243 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 179 (1873); non Gray. *Schoenus cymosus* Muhlenberg, Cat. 6 (1813), *nomen nudum*, and Descrip. Gram. 8 (1817); non Willdenow. *Phaeocephalum cymosum* House, Am. Midland Nat. vi. 201 (1920). *Dichromena cymosa* Macbride, Field Mus. Pub. Bot. xi. 5 (1931).—Low open places on the Coastal Plain from New

Jersey to northern South Carolina and inland to the mountains of the Carolinas, Georgia and Alabama; westward through Tennessee, with a few stations on the southern shores of Lake Michigan and Lake Ontario; also in coastal ranges in northern California; distributed along the Mississippi southward on the lower drainage of its western tributaries, the Missouri, Arkansas, and Red Rivers; scattered in eastern Texas, Louisiana and the coastal counties of Mississippi and Alabama; also on the peninsula of Florida, the Greater Antilles, the island of Dominica and in Central America. The citation of representative specimens is omitted because this common and widely spread variety has been so well known under the misapplied name of "*R. cymosa* Ell." However, since the nomenclatural history of the plant has been so confused it seems best to designate a type, and that is cited below. VIRGINIA: dry pinelands about 4 miles northwest of Waverly, Sussex Co., July 26, 1936, *Fernald & Long*, no. 6070 (G, TYPE; P, ISOTYPE).

In 1798 Willdenow published in his revision of the Cyperaceae for the Species Plantarum a new species, *Schoenus cymosus*. The abbreviation *v. s.* (vidi siccas)[1] appended to his description indicates that at that time a dried specimen of the same existed in his herbarium.

Forty-one years later Kunth relegated *S. cymosus* Willd. to the synonymy of *Scirpus polyphyllus* Vahl. In so doing he added to his citation of Willdenow's Species Plantarum, i. page 265 the herbarium number 1247 of the Willdenow type.

Recently Kükenthal,[2] in his treatment of *Schoenus* as part of his projected monograph of the *Rhynchosporoideae*, lists *Schoenus cymosus* Willd. as equivalent to *Rhynchospora cymosa* Ell.

The original description of Willdenow does not mention either style or achene. Due to the present international situation, it is impossible to confirm or refute by an examination of these details in the type-specimen itself either the diagnosis of Kunth or the more commonly held opinion of Kükenthal. However, not only was Kunth personally in a position to study the Willdenow type, but his citation of the not otherwise published herbarium number 1247 seems to indicate that he availed himself of this opportunity. Also, as will be indicated in the following paragraph, Kunth was well aware of the confusion surrounding Elliott's application of the specific name *cymosa* to *Rhynchospora*. Kükenthal, on the

[1] Willdenow, Sp. Pl. 1: 265 (1797).
[2] Fedde, Rep. Spec. Nov. xliv. 187 (1938).

contrary, gives no indication that he has as yet either personally examined the Willdenow type or studied in detail Elliott's description of *R. cymosa*. I am, therefore, assuming *S. cymosus* Willd. to be correctly placed by Kunth in the synonymy of *Scirpus polyphyllus*.

In 1813 the name *Schoenus cymosus* appears again, this time in the list which constitutes Muhlenberg's Catalogue. Muhlenberg's description of his new species, a necessity to the valid publication of every new species, did not follow until the publication of his Descriptio Uberior Graminum, 1817. When the description appeared, however, it unquestionably applied *S. cymosus* Muhl. to the plant which now passes under the name of *R. cymosa*. Technically, since the Willdenow species and the Muhlenberg species are not identical, Muhlenberg's name becomes a later homonym of the earlier, and, as such, is illegitimate under *Schoenus* according to the International Rules.

In 1816, while the status of *S. cymosus* Muhl. was that of a *nomen nudum*, Elliott published the first pages of his Sketch of the Botany of South Carolina and Georgia. Here he described in detail a *Rhynchospora cymosa* which he supposed to be *S. cymosus* of Muhlenberg, but, in reality, Muhlenberg's species was not validly published until a year later, when it was accompanied by its description. Elliott made, therefore, not a new combination, but a new species. Consequently it is imperative to determine the identity of his specimen which is obviously the type of *Rhynchospora cymosa*.

Kunth in his Enumeratio Plantarum assigns *R. cymosa* Elliott to *R. distans* (Michx.) Vahl, basing his determination upon a specimen "a Beyrichio misso." Both Torrey and Gray had previously suspected that Elliott's description did not apply to the plant which they knew as *R. cymosa* and which they erroneously attributed to Willdenow.

To come at the bottom of this confusion, Prof. M. L. Fernald, during the spring of 1938, kindly examined the Elliott type for me, and he states that, although immature, it is undoubtedly *R. glomerata* (Michx.) Vahl. The name *R. cymosa*, then, since it has no connection with *S. cymosus* Willd., properly dates from Elliott, belongs in the synonymy of *R. glomerata*, and cannot be rightfully used to designate any other entity.

This conclusion necessitates for the plant which was the basis of Muhlenberg's *S. cymosus* and which has until the present passed as *R. cymosa*, another name. Chapman in 1860 set apart and described the smaller *R. cymosa*, var. *globularis*. Small in 1933 raised this variety to specific rank. Since in my judgment no boundary exists which specifically delimits the larger from the smaller plant, I am accepting Chapman's interpretation rather than that of Small. *R. globularis*, therefore, becomes the correct specific name. Var. *typica* is the small plant originally set apart by Chapman as var. *globularis*, and to the plant formerly treated as *R. cymosa*, I am giving the name *R. globularis* var. *recognita*.

After this discussion of *R. cymosa* was put into final form, Professor Fernald received, through the kindness of Professor Diels, Director of the Botanical Museum at Berlin, a photograph of *Schoenus cymosus*, no. 1247, in the Willdenow Herbarium. The specimen[1] was clearly a young state of *Scirpus polyphyllus*, as stated in Kunth's annotation on the right-hand side of the sheet. The specimen-cover bore in the left-hand corner the no. 1247, and on the right, in Willdenow's hand, "*Schoenus cymosus* Sp. Pl. Habitat in America boreali." This was accompanied by a diagnosis of *Schoenus umbellatus* copied from Walter,[2] in which the name *S. umbellatus* has been replaced by that of *Scirpus polyphyllus*.

59c. Var. **pinetorum** (Small), stat. nov. Leaves 1.5–2 mm. wide: clums obtusely trigonous, slender, erect, becoming flexuous, 2.7–6.9 dm. in height: inflorescence 1–4 weak glomerulose cymes: bracts inconspicuous: spikelets nearly globose, 2-flowered, 1-fruited, compact, 2.5–3 mm. long: scales mucronulate or obtuse: bristles 6, not exceeding ⅔ the height of the achene: achene 1.4 mm. wide, 1.3–1.4 mm. long; the pale flat surface covered with a dark nearly isodiametric reticulation: tubercle triangular, 0.4–0.5 mm. high. PLATE 831, FIG. 5A; MAP 71.—*R. pinetorum* Britton & Small, in Small, Man. 183, 1503 (1933).—Moist areas in pinelands and savannas, the Peninsula of Florida, west along the coast to Louisiana; also in western Cuba and Jamaica. FLORIDA: moist pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 4871 (G); prairie near St. Johns River, Osceola Co., *McFarlin*, no. 4908 (CU); in a low pineland, Aripeka, Pasco Co., *O'Neill*, no. 2611 (CU, NY); Manavista, Manatee Co., *Tracy*,

[1] Now, with the complete herbarium at Berlin, presumably lost.
[2] Walter, Fl. Car. 70 (1788).

no. 6991 (G); pinelands west of Punta Gorda, DeSoto Co., *Small, Mosier & DeWinkler*, no. 10912 (NY, TYPE of *R. pinetorum* Britton & Small); in moist sandy ditch along roadside, Rialto, Lee Co., *Moldenke*, no. 1011 (D, NY); glade, Cutter & Black Pt., Dade Co., *Small & Carter*, no. 885 (P); swampy thicket, Washington Co., May, *Curtiss*, no. 3149 (NY). LOUISIANA: low prairies, Jennings, Jefferson Davis Parish, *Palmer*, no. 7624 (Mo, P, US). CUBA: Colpothrinax savanna between Pinar del Rio and Caloma, Pinar del Rio, *Britton, Britton & Cowell*, no. 10084 (NY). JAMAICA: along rivulets at Moneague, 1850, *Alexander* (G).

R. pinetorum Small is superficially identical with the weaker state of *R. globularis*, var. *recognita* found in the western States and the Greater Antilles. It has the same attenuated appearance, the same weak cymes, turgid spikelets, inconspicuous bracts and nearly orbicular short scales. Even its achene is similar in shape, size and tubercle. Its only claim to specific rank depends upon the surface sculpturing of the achene. This consists of a brown nearly isodiametric reticulation over a flat, usually pale background. *R. globularis* and the var. *recognita* have, by contrast, an elongate reticulation with the shorter sides of the alveoli accentuated so as to form transverse ridges on the surface of the achene. A study of the whole *globularis*-complex in Florida and Cuba, however, reveals that in this region transitional stages between isodiametric and elongate pitting with a ridged surface occur. Such are the achenes from the collection of Tracy, no. 7001, from Florida, and of Curtiss, December, 1903, from the Isle of Pines. It seems best, therefore, to reduce Small's entity to the status of a variety.

(*To be continued*)

RHYNCHOSPORA, SECTION EURHYNCHOSPORA, IN CANADA, THE UNITED STATES AND THE WEST INDIES

Shirley Gale

(*Continued from page 249*)

Series 11. **Caducae,** ser. nov. Cymis decompositis saepissime valde fasciculatis patentibus corymbiformibus: spiculis 1–10 (semper fere 4–5)-carpis: squamis laxe imbricatis: setis 1–6 antrorse serrulatis saepissime validis (*R. perplexa* et *R. microcarpa* exceptis): achaenio elliptico-obovato vel late obovato vel suborbiculari saepissime rugoso cancellato vel striato, obscure marginato.

Growing in damp depressions, swamps, pond-margins and shallow water of the pine barrens, savannas and open woodland of the Coastal Plain; infrequent inland; also in the West Indies. Caespitose: leaves 1 (rarely)–7.5 mm. wide: culms of well developed specimens approximately 1 m. high, usually erect, becoming flexuous toward the summit, less often weakly ascending: cymes decompound, those of most species corymbiform, densely fasciculate, less often weakly spreading and with few spikelets or forming a globose net in *R. miliacea:* spikelets containing 1–mostly 4–5 (less often 6–10) achenes: scales loosely imbricate: bristles usually well developed (1–3 and rudimentary in *R. perplexa*), antrorsely serrulate: achenes elliptic-obovate to broadly obovate or suborbicular in outline, usually ridged, always cancellate or striate, obscurely marginate: tubercle basally deltoid.—*Rhynchospora* V. *Glomeratae* Small, Man. 175 (1933), in part. *Rhynchospora*, Series B. *Diplostyleae*, Sect. 5. *Glaucae* Clarke in Urban, Symb. Ant. ii. 106 (1900), in part.

Key to Species in Series Caducae

a. Bristles equalling or exceeding the achene....*b.*
  b. Achene slenderly ellipsoid-obovoid, 2–2.2 mm. in length
    60. *R. inexpansa.*
  b. Achene slenderly to broadly obovoid or subglobose, less than 1.8 mm. in length....*c.*
    c. Branchlets of the 6–9 cymes stiffly divaricate or reflexed, giving the appearance of a loose web; achene pale yellow-brown.....61. *R. miliacea.*
    c. Branchlets of the 2–5 cymes ascending to spreading, if divaricate never stiffly so; achene castaneous....*d.*
      d. Achenes broadly obovate to suborbicular in outline, umbonate or swollen above, compressed below, 1.2 mm. wide or wider, 1.4 mm. long or longer....*e.*
        e. Achenes striate, castaneous, 1.4–1.6 mm. wide, 1.4–1.7 mm. long, with a definite nearly terete stipe which is 0.3–0.4 mm. in length; stamens conspicuously marcescent.....62. *R. odorata*

e. Achenes plainly cancellate, 1.2–1.6 mm. wide, 1.4–1.6 mm. long, with a short thick inconspicuous stipe; stamens not conspicuously marcescent....63. *R. caduca.*

d. Achenes slenderly obovate or, if obovate to suborbicular in outline, small, gradually biconvex and not conspicuously swollen above, 0.8–1.2 mm. wide, 1–1.4 mm. long....*f.*

f. Cymes loose, spreading, the lax filiform branchlets widely divergent; spikelets few....*g.*

g. Bristles well exceeding the tubercle; tubercle deltoid-attenuate with setose margins.....64. *R. mixta.*

g. Bristles equalling the achene; tubercle deltoid, somewhat decurrent, the margins bare...65. *R. decurrens.*

f. Cymes congested, corymbiform, the filiform branchlets ascending; spikelets numerous....*h.*

h. Achenes flat, the short transverse walls of the narrowly oblong alveoli pulled up into sharp ridges: bristles irregularly spreading....66. *R. schoenoides.*

h. Achenes moderately biconvex, the alveoli subisodiametric to broadly oblong, rugulose to only slightly ridged; bristles usually stiffly erect and closely connivent around the achene....67. *R. microcarpa.*

a. Bristles shorter than the achene or failing....*i.*

i. Achene strongly flattened, prominently ridged, striate....*j.*

j. Bristles 6, not exceeding ⅔ the achene; transverse ridges of the achene approximately 12, closely spaced; tubercle decurrent; spikelets 4 mm. long.....68. *R. Torreyana.*

j. Bristles none or 1–3 rudiments; transverse ridges of the achene less than 8, widely separated.....69. *R. perplexa.*

i. Achene biconvex, slightly if at all ridged, the alveoli subisodiametric to broadly oblong.....67. *R. microcarpa.*

60. R. INEXPANSA (Michx.) Vahl. Caespitose, often forming stools of several–15 culms: leaves flat, 2–3.5 mm. wide; margins finely serrulate; tips triquetrous: culms obtusely triangular, becoming slender, flexuous, 0.3–1.2 m. high: inflorescence 3–6 strictly elongated decompound fasciculate cymes, 0.6–1 dm. in length, the filiform arching branches approximate; lateral cymes on exserted peduncles: spikelets fusiform, sessile or pedicellate, strongly ascending, 2–5-flowered, 1–4-fruited, 4.5–6 mm. long: scales castaneous, acute or aristulate, caducous: bristles 6, upwardly hispidulous, capillary, erect, once again as high as the tubercle: achene slenderly ellipsoid-obovoid, narrowing toward the base, extremely flattened, transversely ridged, castaneous, 0.8–1 mm. wide, 2–2.2 mm. long: tubercle deltoid, compressed, 0.9–1.2 mm. long, pale, with thickly setose margins. PLATE 833, FIGS. 1A and 1B; MAP 75.—Enum. ii. 232 (1806); Elliott, Sk. Bot. S. Car. and Ga. i. 61 (1816); Gray, Ann. Lyc. N. Y. iii. 200, pl. 6, fig. 6 (1835) and Man. ed. 2, 505 (1856); Chapman, Fl. So. U. S. 525 (1860); Britton & Brown, Ill. Fl. i. 280, fig. 660 (1896); Britton, Man. 186 (1901); Small, Fl. 198 (1903) and Man. 186 (1933); Robinson & Fernald in Gray, Man. ed. 7: 200, fig. 318 (1908). *Schoenus inexpansus* Michaux, Fl. Bor.-Am. i. 35 (1803);

Muhlenberg, Descrip. Gram. 9 (1817). *Phaeocephalum inexpansum* House, Am. Midland Nat. vi. 202 (1920).—Common in low or exsiccated ground in open areas of pinelands on the Coastal Plain from southeastern Virginia to Georgia and west to eastern Texas; inland localities in northern Alabama, northwestern Arkansas and along the Red River. Citation of specimens of this unique and well known species is not considered necessary in this paper.

61. R. MILIACEA (Lam.) Gray. Stoloniferous: leaves narrowly linear, 6–7.5 mm. wide, erect, flat, carinate; the keel and margins scabrous to smooth; tip triquetrous: culms 3-angled, leafy, slightly arching or more commonly stiffly erect, 0.9–1.4 m. high: cymes 6–9, decompound, the long wiry capillary branchlets stiffly divaricate or often reflexed, giving to the cyme a loose, web-like appearance, 0.7–1 dm. wide; lateral cymes on subexserted peduncles: spikelets ovoid, turgid, 3–4 mm. long, distant on elongated slender pedicels, 4–12-flowered, 3–10-fruited: scales aristulate, loosely imbricate, promptly caducous exposing a "spikelet" of naked achenes: bristles 6, fragile, spreading, upwardly serrulate, exceeding the tubercle: achene broadly obovoid, biconvex, transversely ridged to rugulose, longitudinally striate, pale, 0.9–1.1 mm. wide, 1–1.3 mm. long: tubercle depressed-conic, often apiculate, 0.2–0.4 mm. long. PLATE 833, FIGS. 2A and 2B; MAP 74.—Ann. Lyc. N. Y. iii. 198, pl. 6, fig. 4 (1835); Chapman, Fl. So. U. S. 526 (1860); Grisebach, Cat. Pl. Cub. 243 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana viii. 84 (1871) and Fl. Cub. 179 (1873); Small, Fl. 198 (1903) and Man. 186 (1933); Britton, Mem. Soc. Cubana Hist. Nat. ii. 199 (1916); Kükenthal, Fedde Rep. Spec. Nov. xxiii. 211 (1926). *Schoenus miliaceus* Lamarck, Ill. Gen. i. 137 (1791). *R. sparsa* Vahl, Enum. ii. 230 (1806); Elliott, Sk. Bot. S. Car. and Ga. i. 62, pl. 2, fig. 1 (as *Schoenus*) (1816); Torrey, Fl. N. and Mid. St. no. 1: 56 (1823); Clarke in Urban, Symb. Ant. ii. 131 (1900). *Schoenus sparsus* Michaux, Fl. Bor.-Am. i. 35 (1803); Muhlenberg, Descrip. Gram. 7 (1817). *Phaeocephalum miliaceum* (mispelled *milaceum*) House, Am. Midland Nat. vi. 202 (1920).—Often standing in water of swamps of the Coastal Plain from southeastern Virginia and North Carolina (rarely) southward to the Florida Peninsula, and west to Louisiana; also in the western provinces of Cuba and in eastern Hispaniola. VIRGINIA: *Read* (P, as "*Schoenus sparsus*"), presumably from Norfolk Co. NORTH CAROLINA: swamp at Newport, Carteret Co., *Godfrey*, no. 4412 (D, G); peaty grass-sedge savanna at Carolina Beach, New Hanover Co., *Godfrey*, no. 4684 (G, NC); edge of swamp, Southport, Brunswick Co., Jan. 28, 1922, *Bartram* (G, P). SOUTH CAROLINA: swamp, 1½ miles west of Andrews, Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 541 (G, NY);

wet places along Santee Canal, Berkeley Co., *Ravenel* (G). CAROLINA: in umbrosis Carolinae, *Michaux Herb.* (G, type-photo of *Schoenus sparsus*); east Carolina, *D. Fraser in Herb. Leonard* (G, TYPE-PHOTO of *Schoenus miliaceus*). GEORGIA: shaded pool of clear cold water, Leslie, Sumter Co., *Harper*, no. 1017 (G, NY, US); semi-calcareous swamp of small creek about ½ mile east of Cedar Springs, Early Co., *Harper*, no. 3635 (G, P, US). FLORIDA: swamps near Jacksonville, Duval Co., *Curtiss*, no. 3163 (CU, D, G, NY, P, US); Devils Mill Hopper, lime-sink near Gainesville, Alachua Co., *O'Neill*, no. 586 (US); rooting under water, Silver Springs, Marion Co., *O'Neill*, no. 2606 (CU); damp places, Ormond, Volusia Co., *Fuller* (G); Eustis, Lake Co., *Nash*, no. 1845 (G, NY, P, US); in mud of bog in open woods near Oviedo, Seminole Co., *Correll*, no. 6361 (CU, D, G); in moist woodland, south of Aripeka, Hernando Co., *Moldenke*, no. 1065 (D, NY); rooting under water in a spring, pasture hammock, Lake Jovita, Pasco Co., *O'Neill*, no. 1060 (CU, US); swamp, between Shingle and Bonnet Creek, Kissimmee, Osceola Co., Mar. 13, 1938, *Singletary* (D); in a swamp, Polk City, Polk Co., *O'Neill*, no. 7682 (CU); sand-barren swamps, Tampa, Hillsborough Co., Apr. 11, 1923, *Churchill* (G); the Okaloacoochee Slough, Big Cypress, Lee Co., *Small*, no. 8311 (NY); in everglades near Camp Long View, Dade Co., *Small & Wilson*, no. 1644 (NY); bogs and deep miry places, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 231a (G, NY, US). ALABAMA: deep shaded springy places, eastern shore, Mobile Bay, Point Clear, Baldwin Co., June 10, 1879, *Mohr* (US). LOUISIANA: abundant in cypress-tupelo swamp, Rone Ferry on Tickjaw River, Livingston Parish, *Brown*, no. 6573 (La); New Orleans, 1832, *Drummond* (G); sandy ditch near swamp in northern vicinity of Houma, Terrebonne Parish, May 1, 1913, *Wurzlow* (US); pine swamps, Calcasieu Parish, April, 1870, *Featherman Collection* (La); marshes, Alexandria, Rapides Parish, *Herb. Thurber* (G). CUBA: Santo Tomas, Cienaga de Zapata, Santa Clara, *Acuña*, no. 4305 (NY); in coastal swamps, in a wood of Peralta Estate, Batabano, Havana, *León*, no. 14195 (NY); *Wright*, no. 3788 (G, US). HISPANIOLA: Macary in Etang Promosse, Marigot, Massif de la Selle, Haiti, *Ekman*, no. 5978 (NY, US).

62. R. ODORATA C. Wright ex Griseb. With short stolons: leaves 3.5–6 mm. wide, arching, carinate, smooth, becoming triquetrous at the tip, with finely serrulate angles: culms stocky, becoming flexuous at the summit, 3-angled, smooth, 0.7–1.8 m. high: cymes 3–4, decompound, densely fasciculate, 3–4 cm. wide, 3–7.5 cm. long; branchlets mainly arched-ascending: spikelets ovoid, 3–11-flowered, 1–7-fruited, 6–9 mm. long: scales acute-aristate, loosely imbricate, ferruginous, caducous:

Range of 77, Rhynchospora mixta; 78, R. decurrens; 79, R. schoenoides; 80, R. Torreyana; 81, R. perplexa; 82. R. microcarpa.

stamens conspicuously marcescent: bristles 6, irregularly ascending to spreading, slenderly attenuate, usually well exceeding the tubercle, upwardly serrulate, 3.2–4.2 mm. long: achene orbicular in outline, strongly biconvex, transversely ridged and strongly marked by longitudinal striae, castaneous, 1.4–1.6 mm. wide, 1.4–1.7 mm. long, with a conspicuous persistent stipe, 0.3–0.4 mm. long: tubercle deltoid-compressed, somewhat depressed, usually dark with setose margins. Plate 833, figs. 3A and 3B; Map 73.—Cat. Pl. Cub. 242 (1866); C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 83 (1871) and Fl. Cub. 179 (1873). *R. stipitata* Chapman, Fl. So. U. S. ed. 2: 660 (1883); Hemsley, Rep. Sci. Res. Voy. Challenger, Bot. i. 76, pl. 10 (1885); Clarke in Urban, Symb. Ant. ii. 129 (1900); Small, Fl. 198 (1903) and Man. 186 (1933); Britton, Fl. Bermuda, 53, fig. 82 (1918). *R. Marisculus* sensu Clarke in Urban, Symb. Ant. ii. 132 (1900), in part. *R. Marisculus* sensu Britton, Mem. Soc. Cubana Hist. Nat. ii. 200 (1916), in part, excl. syn. *R. jubata* Liebm. *R. Marisculus* sensu Britton & Millspaugh, Bahama Fl. 56 (1920); non Lindl. et Nees in Mart. *R. caduca* sensu Kükenthal, Fedde Rep. Spec. Nov. xxiii. 210 (1926) and xxxii. 77 (1933); non Ell. *Phaeocephalum stipitatum* House, Am. Midland Nat. vi. 202 (1920).—Swamps of the Coastal Plain from North Carolina (one collection from Carteret Co.) to the Florida Peninsula. Bermuda, New Providence of the Bahamas and the Greater Antilles. North Carolina: sand banks near Beaufort, Carteret Co., *Lewis*, no. 76 (NY). Georgia: *Baldwin* (P). Florida: low rich places near Jacksonville, Duval Co., *Curtiss*, no. 3141 (P); swamp near Mosquito Inlet, Volusia Co., *Curtiss*, no. 3174

(CU, G, NY, US); swamp, 7 miles southeast of Ft. Christmas, east of Orlando, Orange Co., June 25, 1927, *O'Neill* (CU); wet thicket, Eau Gallie, Indian River, Brevard Co., *Curtiss*, no. 5719 (G, NC, NY, US); roadside, low ground, Deer Park Section, Osceola Co., Apr. 28, 1938, *Singletary* (D); flatwood ponds, Myers, Lee Co., *Hitchcock*, no. 419 (G, NY, US); Miami, Dade Co., *Tracy*, no. 8987 (C, NY, US); Arch Creek Prairie, Dade Co., *Small, Mosier & Small*, no. 6776 (NY); along canal, 2 miles west of Pine Crest in the Everglades, Monroe Co., *O'Neill*, no. 7647 (D, NY, P). Bermuda: Devonshire Marsh, *Brown & Britton*, no. 94 (G, NY, US). Bahamas: near Nassau, New Providence, *Curtiss*, no. 170 (G). Cuba: La Punta de la Jarela, jurisdiccion Guane, Pinar del Rio, Dec. 23, 1863?[1], *Wright*, no. 3394 (G); in coastal marshes, Cienaga de Gamboa, Pinar del Rio, *Ekman*, no. 17584 (NY); *Wright*, no. 3787 (G, NY, US; cited by Wright in Sauvalle.); somewhat moist places at "Loma Vista," Nueva Gerona, Isla de Pinos, *Ekman*, no. 12374 (US); savanna, Rio de los Casas, Isle of Pines, *Britton & Wilson*, no. 15662 (NY, US); lagoons of Santa Fé, northeast of Stabo, Matanzas, *Roca & Edmond*, no. 9635 (NY); Sabana Guane, Caibarien, Santa Clara, *Fernando*, no. 480 (NY); Cienfuegos and vicinity, Santa Clara, *Cuesta*, no. 764 (NY); al norte de la Bahia de Cochinos, Santa Clara, *León & Loustalot*, no. 9506 (NY). Jamaica: marsh, 1 mile west of Black River, Cornwall, *Britton*, no. 1356 (NY); border of Great Morass, Negril and vicinity, Cornwall, *Britton & Hollick*, no. 2116 (NY). Hispaniola: coastal swamp at Carbarete, Tosua, prov. Puerto Plata, Cordillera Septentrional, Santo Domingo, *Ekman*, no. 14535 (G, NY, US). Puerto Rico: Point Congrejos, *Stevenson*, no. 1706 (NY, US).

63. R. caduca Ell. Spreading by means of short stolons, occasionally forming dense stools: leaves 4–7 mm. wide, flat, slightly carinate, mainly ascending; tips triquetrous, with minutely scabrous angles: culms robust, acutely 3-angled, erect, becoming flexuous at the summit, 0.7–1.2 m. high: cymes 3–5, decompound, strict, 0.5–1.2 dm. long, usually densely fasciculate and often arching, but attenuated specimens occurring with scattered spikelets on weak, spreading branchlets: spikelets ovoid, fasciculate and sessile or single and slenderly pedicellate, 3–6-flowered, 2–5-fruited, 4–4.5 mm. long: scales acute to aristulate, caducous, dark brown, loosely imbricate: bristles 6, brittle, well exceeding the tubercle, upwardly hispidulous: achene obovate to rotund in outline, strongly umbonate, 1.2–1.6 mm. wide, 1.4–1.6 mm. long; entire surface cancellate with the horizontal walls of the oblong alveoli contiguous, accentuated and forming horizontal ridges: tubercle deltoid, compressed and slightly depressed, usually pale, setose, 0.6–0.8 mm. in height. Plate

[1] See Underwood, Bull. Torr. Bot. Cl. xxxii. 297 (1905).

833, FIGS. 4A and 4B; MAP 76.—Sk. Bot. S. Car. and Ga. i. 62 (1816); Gray, Ann. Lyc. N. Y. iii. 199, pl. 6, fig. 5 (1835); Chapman, Fl. So. U. S. 526 (1860); Small, Fl. 197 (1903) and Man. 185 (1933). *R. patula* Gray, Ann. Lyc. N. Y. iii. 201, pl. 6, fig. 8 (1835), for the most part. *Phaeocephalum caducum* House, Am. Midland Nat. vi. 201 (1920).—Frequent in meadows and marshes on the Coastal Plain from southeastern Virginia south to Florida and west to eastern Texas; known inland only from a few localities in the mountains of Georgia and Alabama and in northwestern Arkansas. VIRGINIA: border of damp sandy pine woods east of Gloucester, Gloucester Co., *Fernald & Long*, no. 8613 (G, P); border of pond-hole in woods east of Hornsby (Tampico), York Co., *Fernald & Long*, no. 8611 (G, P); inner border of brackish to fresh marsh along Back Bay at eastern margin of Long Island, Princess Anne Co., *Fernald & Long*, no. 10555 (G); boggy swale by Northwest River, near Northwest, Norfolk Co., *Fernald, Griscom & Long*, no. 4578 (G); swaley tidal shore of Nottoway River, Knight Seine Beach (Battle Beach), Southampton Co., *Fernald & Long*, no. 10148 (G, P); exsiccated argillaceous pineland, about 2 miles east of Stony Creek, Sussex Co., *Fernald & Long*, no. 8999 (G, P). NORTH CAROLINA: in boggy soil near Elizabeth City, Pasquotank Co., *Correll*, no. 2110 (D); marsh at Sligo, Currituck Co., *Godfrey*, no. 5283 (G); marsh at Edenton, Chowan Co., *Godfrey*, no. 5340 (G); meadow, Oxford, Granville Co., *Godfrey*, no. 5496 (G); damp sandy open spots, 4 miles east of Plymouth, Washington Co., *Wiegand & Manning*, no. 588 (G); sandy soil bordering Brice Creek, 2 miles southwest of James City, Craven Co., *Randolph & Randolph*, no. 865 (G); near Deep River, Lee Co., *Blomquist*, no. 5622 (D); Pender Co., June 7–12, 1899, *Ashe* (NC); drainage ditch at Carolina Beach, New Hanover Co., *Godfrey*, no. 4718 (G); woodland at Lake Waccamaw, Columbus Co., *Godfrey & Shunk*, no. 4169 (G, NC); banks of Little Long Creek, Albemarle, Stanly Co., alt. 250 ft., Aug. 17, 1892, *Small* (NY). SOUTH CAROLINA: in udis juxta Charleston, *Elliott* (G, TYPE-PHOTO); Lancaster Co., *House*, no. 2554 (US); in rich soil in hammock, Isle of Palms, Charleston Co., alt. 5 ft., *Clausen & Trapido*, no. 3567 (NY). GEORGIA: wet meadow near Middle Oconee River, Clarke Co., alt. 575 ft., *Harper*, no. 159 (NY, US); between Alcovy River and No Business Creek, Oconee and Gwinnett Cos., July 14, 1893, *Small* (G); wet woods between Sandfly and Savannah, Chatham Co., *Harper*, no. 1829 (G); in ditches bordering swamp, 14 miles south of Hawkinsville, *Svenson*, no. 6977 (G); margin of pool, Leslie, Sumter Co., *Harper*, no. 1241 (G); Albany, Dougherty Co., *Miller*, no. 502 (US). FLORIDA: low rich places, near Jacksonville, Duval Co., *Curtiss*, no. 3141 (D, G, P); flatwoods, 4 miles west of St. Augustine, St.

Johns Co., June 7, 1940, *West & Arnold* (CU); St. Vincent Island, Franklin Co., *McAtee*, no. 1820a (US); in low pineland, Lake City, Columbus Co., *O'Neill*, no. 7674 (CU); wet hammock, vicinity of Eustis, Lake Co., *Nash*, no. 139 (G); in edge of low woods near Mabel, Sumter Co., *Curtiss*, no. 6631 (G, P); swamps, Myers, Lee Co., *Hitchcock*, no. 422 (G); moist open ground, 1 mile west of Arcadia, DeSoto Co., *Blomquist*, no. 8958 (G, D); near Tallahassee, Leon Co., *Berg* (NY); Herb. Baldw. (NY, annotated as *R. patula* by Gray). ALABAMA: Auburn, Lee Co., *Earle*, no. 859 (NY); pine woods, Ball Play, Etowah Co., *Mohr* (US). MISSISSIPPI: Saratoga Co., *Tracy*, no. 8464 (G). ARKANSAS: Benton Co., *Plank*, no. 17 (NY). LOUISIANA: in prairies, Coteau Duchamps, St. Martin Parish, June 23, 1893, *Langlois* (CU, G); open field, Steele Place, Baton Rouge, East Baton Rouge Parish, *Trotter & Chilton*, no. 42 (La); low prairies, Jennings, Jefferson Davis Parish, *Palmer*, no. 7625 (CA, Mo, P). TEXAS: Palestine, Anderson Co., Apr. 19, 1895, *Plank* (NY); Orange, Orange Co., *Letterman* (Mo); Port Arthur, Jefferson Co., July 5, 1927, *Kolthoff* (P); about 5¾ miles south of Anahuac, Chambers Co., *Cory*, no. 22404 (G); Cypress City, Harris Co., *Boll*, no. 884 (G); Caney Post Office, Brazoria Co., *Bechdolt*, no. 4 (G); banks, Hempstead, Waller Co., *Hall*, no. 711 (G, Mo); Burnet, Burnet Co., Sept. 14, 1892, *Plank* (NY); prairie near Indianola, Calhoun Co., *Ravenel*, no. 159 (NY); coastal prairie, Midfields, Matagorda Co., *Tharp*, no. 2139 (US).

64. R. MIXTA Britt. ex Small. Stoloniferous: leaves 3–4 mm. wide, flat, subcarinate, becoming triquetrous at the tip; margins minutely scabrous: culms triangular, slender, becoming filiform and arched toward the summit, approximately 1 m. in height: cymes 4–6, decompound, fasciculate, 2.5–5.5 cm. wide, often extremely lax and flexuous in appearance due to the attenuated pedicels which may be strongly divergent; axillary cymes on exserted peduncles: spikelets ovoid, 2 (rarely)–10-flowered, 1 (rarely)–10-fruited, 4–6 mm. in length, commonly distant: scales mucronulate or acute, loosely imbricate, characteristically caducous, castaneous: bristles 6–8, extremely slender, brittle, well exceeding the tubercle, upwardly hispidulous, 2.2–2.8 mm. long: achene slightly compressed, otherwise slenderly obovoid, 0.8–0.9 mm. wide, 1.3–1.4 mm. long; surface pale and dull but covered with a brown isodiametric reticulation, the transverse walls of which are barely if at all elevated: tubercle deltoid-attenuate, 0.4–0.9 mm. long, compressed, with a conspicuously setose margin. PLATE 832, FIGS. 4A and 4B; MAP 77.—Fl. 197, 1328 (1903) and Man. 186 (1933). *R. prolifera* Small, Fl. 198, 1328 (1903) and Man. 186 (1933). *Phaeocephalum mixtum* House, Am. Midland Nat. vi. 202 (1920). *Phaeocephalum proliferum* House, Am. Midland Nat. vi. 202 (1920).—Swampy woodlands

of Coastal Plain from North Carolina to northern Florida and west to eastern Texas. North Carolina: Elizabeth City, Pasquotank Co., *Kearney*, no. 1993 (US); ditch, Beaufort Co., *Blomquist*, no. 5614 (D); stream-margin, Holden Beach, Brunswick Co., *Blomquist*, no. 5614 (P). South Carolina: wet swampy woodland, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 111 (D, G, NY, P). Georgia: moist shaded sandy place in Ogeechee River swamp, Burke Co., *Harper*, no. 768 (G, NY, US); bank of Ocmulgee River, Hawkinsville, Pulaski Co., *Harper*, no. 1385 (G, NY, US); Marshallville, Macon Co., *Earle*, no. 2973 (NY, type); rich woods in southeastern part of Sumter Co., *Harper*, no. 490 (NY, US); moist sandy places, Leslie, Sumter Co., *Harper*, no. 408 (NY, type of *R. prolifera* Small; US, isotype); swamp of Chickasawhatchee Creek at Johnson Bridge N., Elmodel, Baker Co., *Eyles*, no. 7059 (Hermann Herb.). Florida: wet sandy soil near Perry, Taylor Co., *Palmer*, no. 27285 (G); low ground, Marianna, Jackson Co., May 26, 1940, *Sargent* (Sargent Herb.); river swamps, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 4471 (G, NY, US); swamps, Walton Co., 1885, *Curtiss* (NY); swampy woods along Yellow River near Milligan, Santa Rosa Co., *Curtiss*, no. 6854 (G; US, in part). Alabama: palmetto swamp, vicinity of Auburn, Lee Co., *Pollard & Maxon*, no. 42 (G, NY, US). Mississippi: Ocean Springs, Jackson Co., *Tracy*, no. 114 (NY). Louisiana: vicinity of Covington, St. Tammany Parish, *Arsène*, no. 12307 (US); mixed pine and palmetto, half way between Walker and St. Sillman, Livingston Parish, *Trotter & Chilton*, no. 129 (La); ditches, Baton Rouge, Baton Rouge Parish, May 19, 1874, *Joor* (US). Texas: in bed of brook in high mixed forest, 5 miles south of Nacogdoches on Lufkin Road, Nacogdoches Co., *Lundell & Lundell*, no. 9643 (CU); 1883, *Neally*, no. 28 (NY, US); East Texas, *Wright* (G).

R. mixta has a culm which, in common with so many members of this series, varies in degree of flexuosity from upright, with a curving distal internode, to weak, attenuated and nearly procumbent. Specimens of the latter extreme have open fascicles with long filiform divergent branchlets; those with the greatest stiffness, however, have flexuous but not open fascicles, the branchlets of which are often shorter, usually ascending, causing a closer approximation of the spikelets. As in the closely related *R. miliacea*, the number of achenes in a spikelet is very variable. I consider that Small, in designating those specimens which have spikelets bearing from 8–10 achenes as *R. prolifera*, set up an artificial boundary which alone delimited that species from *R. mixta* of Britton.

65. R. DECURRENS Chapman. Caespitose: leaves flat, 3 mm. wide, smooth, soft, with 3-angled setaceous tips: culms obtusely trigonous, smooth, slender, becoming flexuous, leafy, approximately 0.8–1.1 m. high: cymes 4–5, decompound, loose, somewhat spreading, 2–5 cm. wide, the filiform branchlets lax or drooping, bearing a few scattered or somewhat congested spikelets; lateral cymes distant, on exserted peduncles: spikelets rotundly ovoid, 3 mm. long, 3–4-flowered, 2–3-fruited, scattered or somewhat congested on capillary pedicels: scales mucronulate or muticous, chestnut-brown, caducous: bristles 6, extremely tenuous, fragile, upwardly hispidulous, equalling the achene in height: achene obovoid, slightly biconvex, bright chestnut, 0.9 mm. wide, 1.3 mm. long; the surface pitted, tending to become transversely rugulose: tubercle deltoid, compressed, somewhat decurrent, not setose. PLATE 832, FIGS. 1A and 1B; MAP 78.—Fl. So. U. S. 525 (1860); Small, Fl. 198 (1903) and Man. 185 (1933). *Phaeocephalum decurrens* House, Am. Midland Nat. vi. 201 (1920).—Swamps and marshy stream-banks, Columbus Co., North Carolina (one collection) and Florida. NORTH CAROLINA: edge of swamp, 1 mile east of Old Dock, Columbus Co., *Blomquist & Correll*, no. 9444 (D). FLORIDA: in swamp, Callahan, Nassau Co., *O'Neill*, no. 6017 (CU); south branch, St. Mary's River, summer, 1885, *Curtiss* (NY); marshy banks of streams, Dead Lakes, Calhoun Co., *Mohr*. no. 68 (US); marshy banks of lakes and rivers, Wewahitchka, Calhoun Co., *Chapman in Biltmore Herb.* no. 5964 (G, in part; NY); St. Joseph, Pasco Co., *Chapman* (NY); damp thickets, bank of Chittahachee River, Monroe Co., June 25, 1880, *Mohr* (US, in part); swamps, western Florida, July 20, 1880, *Mohr* (NY).

R. decurrens is most closely related to *R. mixta* Britt. This is at once apparent in the habit which is indistinguishable from that of *R. mixta*, for the plant has the same lax and drooping aspect with the typical flat soft leaves, and the loose cymes with their spreading or drooping filiform branchlets. The distinction between the two species depends upon achenial characters. The six bristles surrounding the customarily pale chestnut achene of *R. mixta* exceed the deltoid-attenuate tubercle which is 0.4 (rarely)–0.9 mm. high and marginally setose. The achene of *R. decurrens*, however, while similar to that of *R. mixta* in pitting and general outline, is a brilliant chestnut, surrounded by six bristles in height not equalling the tubercle, which is short (not exceeding 3 mm. long), broadly deltoid, and without a trace of marginal setae.

66. R. SCHOENOIDES (Ell.) Wood. Coarsely caespitose: leaves 4.5–5 mm. wide, flat, toward the apex becoming carinate and finely serrulate along the margins, triquetrous at the apex: culms 3-angled, becoming slender and flexuous, 0.8–1.5 m. high: cymes 2–5, decompound, densely fasciculate, irregularly corymbiform, 2–6 cm. wide; the branchlets approximate, arching, terminating in glomerulate clusters of spikelets; lateral panicles subexserted on slender peduncles: spikelets rotundly ovoid, turgid, 3–6-flowered, 2–4-fruited, 2.5–3.2 mm. long: scales mucronulate, loose, caducous, dark brown: bristles 6, exceeding the tubercle, upwardly hispidulous, characteristically divergent: achene pyriform, extremely flattened, heavily striate between the few well-spaced transverse ridges, often pale to castaneous, 0.9–1.1 mm. wide, 1.2–1.3 mm. long: tubercle deltoid, sometimes apiculate, compressed, 0.3–0.4 mm. high. PLATE 834, FIGS. 2A and 2B; MAP 79.—Class-Book of Bot. 744 (1861); Britton, Trans. N. Y. Acad. Sci. xi. 92 (1892); Small, Fl. 198 (1903) and Man. 185 (1933). *Scirpus schoenoides* Elliott, Sk. Bot. S. Car. and Ga. i. 89 (1816). *R. Elliottii* Dietrich, Sp. Pl. ed. 6: ii. 69 (1833), non Gray; Chapman, Fl. So. U. S. 525 (1860). *R. multiflora* Gray, Ann. Lyc. N. Y. iii. 200, pl. 6, fig. 7 (1835). *Phaeocephalum schoenoides* House, Am. Midland Nat. vi. 202 (1920).—Roadside ditches and low ground in pine barrens and prairies of the Coastal Plain from North Carolina south to Georgia and west to eastern Texas. NORTH CAROLINA: sandy grassy pineland 10 miles east of Washington, Beaufort Co., *Oosting*, no. 15 (D); roadside-ditch through savanna, between Newport and New Bern, Carteret Co., *Blomquist*, no. 11247 (D); low pineland at Dunn, Harnett Co., *Godfrey*, no. 6143 (D, G); in ditch, Robeson Co., July 4, 1940, *Schallert* (G); in low wet sandy soil of ditch along road between Garland and White Lake, Bladen Co., *Correll*, no. 2562 (CU, D, G); pineland at Hallsboro, Columbus Co., *Godfrey*, no. 6267 (G). SOUTH CAROLINA: peaty exsiccated area in savanna at the side of road, 12 miles north of Georgetown, Georgetown Co., *Godfrey & Tryon*, no. 10 (CU, D, G, NY, P); peaty drainage-ditch, 2 miles west of Salters, Williamsburg Co., *Godfrey & Tryon*, no. 518 (G). GEORGIA: *Dr. Baldwin* (G, TYPE-PHOTO); sand-clay ditch, by pine woods, 5 miles northwest of Ways, Bryan Co., *Wiegand & Manning*, no. 626 (G); in swamp of Big Lott's Creek, Bullock Co., *Harper*, no. 974 (G, US); low ground, Folkston, Charlton Co., *Biltmore Herb.*, no. 10734a (US); wet clay holes, 5 miles west of Tifton, Tift Co., *Svenson*, no. 7085 (G); pine barrens near Americus, Sumter Co., July 20, 1897, *Harper* (G); Georgia?, *Elliott* (NY, fragment from Elliott Herb.). ALABAMA: boggy sandy ditch, 16 miles south of Dothan, Houston Co., *Wiegand & Manning*, no. 627 (G); Leroy, Washington Co., *Bequaert*, no. 11521 (G); *Drummond*, no. 251

(G). MISSISSIPPI: Ocean Springs, Jackson Co., *Pollard*, no. 1124 (G, NY, US); Pass Christian, Harrrison Co., Dec. 18, 1919, *Bartram* (P). LOUISIANA: stream-bottom south of Franklinton, Washington Parish, *Brown*, no. 6446 (La); vicinity of Covington, St. Tammany Parish, *Arsène*, no. 11066 (G); same locality, *Arsène*, no. 12220 (Mo, US); plentiful in pools along road in pine flats 2 miles west of Hammond, Tangipahoa Parish, *Hester*, no. 808 (La); New Orleans, *?Drummond in Herb. Hook.*, no. 367 (NY); common in prairie west of Crowley, Acadia Parish, *Brown*, no. 5810 (La); common in low prairies, vicinity of Lake Charles, Calcasieu Parish, *Mackenzie*, no. 44 (Mo, NC). TEXAS: grows in a pond 3 miles below Town Bluff, Tyler Co., *Wright* (G); 2.6 miles east of Camp Jackson, Hardin Co., *Cory*, no. 19714 (CU); near Liberty, Liberty Co., *Bequaert*, no. 11500 (G).

67. R. MICROCARPA Baldw. ex Gray. Caespitose or solitary: leaves 1–3 mm. wide, rarely narrower, flat; upper margins serrated; tips 3-angled: culms obtusely triangular, leafy, ascending, becoming tenuous and flexuous above, 5–8 dm. high: cymes 1–4, decompound, fasciculate, often densely so, irregularly corymbiform, 1–6 cm. wide; lateral fascicles short-pedunculate: bracts leafy: spikelets ovoid, sometimes rotundly so, 3–4-flowered, 2–3-fruited, congested, sessile, 2.5–3 mm. long: scales aristulate to acute, dark brown, more or less loose: bristles 6, varying in length from ½ the achene to equalling the tubercle, stiffly erect: achene obovoid, slightly biconvex, glistening bright brown, deeply alveolate, with the pits subisodiametric to broadly oblong, only slightly ridged, 0.8–1.2 mm. wide, 1–1.2 mm. long: tubercle short, deltoid, compressed, 0.2–0.5 mm. long. PLATE 832, FIGS. 2A and 2B; MAP 82.—Ann. Lyc. N. Y. iii. 202, pl. 6, fig. 9 (1835); Chapman, Fl. So. U. S. 525 (1860); Britton, Trans. N. Y. Acad. Sci. xi. 92 (1892); Clarke in Urban, Symb. Ant. ii. 130 (1900); Britton, Mem. Soc. Cubana Hist. Nat. ii. 199 (1916); Small, Fl. 198 (1903) and Man. 185 (1933); Britton & Millspaugh, Bahama Fl. 55 (1920); Kükenthal, Fedde Rep. Spec. Nov. xxiii. 210 (1926), in part. *R. patula* Gray, Ann. Lyc. N. Y. iii. 201, pl. 6, fig. 8 (1835), in small part. *R. Torreyana* Gray, var. *microrhyncha* Grisebach, Cat. Pl. Cub. 243 (1866). *R. gracilis* sensu C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 179 (1873), in part; non (Swartz) Vahl. *R. involuta* C. Wright in herb. ex Clarke in Urban, Symb. Ant. ii. 130 (1900). *R. perplexa* sensu Britton & Millspaugh, Bahama Fl. 55 (1920), not as to type, *R. perplexa* Britton ex Small. *R. Edisoniana* Small, Man. 184, 1503 (1933). *Phaeocephalum microcarpum* House, Am. Midland Nat. vi. 202 (1920). *Phaeocephalum patulum* (misspelled *palulum*) House, Am. Midland Nat. vi. 202 (1920), in small part.—Swamps and pond-margins of North Carolina (one collection), southern Georgia

and Florida westward along the coast to Louisiana; also on the Bahamas, and in the western provinces of Cuba and Puerto Rico. North Carolina: Wilmington, *Curtis* (NY, cited by Gray in type-description). Georgia: in shallow pools along Aucilla Creek near Boston, Thomas Co., *Harper*, no. 1636 (G, NY, US). Florida: swampy pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 5415 (G, NC, US); vicinity of Eustis, Lake Co., *Nash*, no. 437 (G, NY, P, US); moist pine barrens, Merritt's Island, Indian River, Brevard Co., *Curtiss*, no. 3149 (CU, G, NY, P, US); "wet weather pond" near Oakland, Orange Co., *Curtiss*, no. 6625 (G, NY, US); hammock, north of Eagle Bay near Kissimmee River, Osceola Co., *Small*, no. 9911 (CU); hammock, 12 miles east of Okeechobee City, Saint Lucie Co., *Small et al.*, no. 9292 (NY); everglades along the Palm Beach Canal, Palm Beach Co., *Small*, no. 8270 (G, NY); everglades along Tamiami Trail west of Miami, Dade Co., *Small*, no. 8835 (NY, type of *R. Edisoniana*); swamp, Big Pine Key, Monroe Co., *Killip*, no. 32075 (CU, G, NY); in everglades south of Tamiami Trail, Collier Co., *Moldenke*, no. 879 (D, NY); in pineland, vicinity of Fort Myers, Lee Co., *Standley*, no. 227 (G, NY); Indian Mound near Citrus Center, DeSoto Co., *Small*, no. 9911 (NY); in a pine barren pond, north of Palma Sola Bay, Manatee Co., *Simpson*, no. 122 (G); swamp, Polk Co., *Fredholm*, no. 6229 (US); Tampa, Hillsborough Co., May, 1876, *Garber* (US); in wet soil near Lake Butler, Pinellas Co., *O'Neill*, no. 2615 (CU); in a low pineland, Pasco, Pasco Co., *O'Neill*, no. 2616 (CU); margins of ponds in the pine barrens, Apalachicola, Franklin Co., *Chapman in Biltmore Herb.*, no. 211a (G, US); open moist soil on St. Vincent's Island, Franklin Co., *Correll*, no. 5604 (D). Mississippi: Horn Island, Jackson Co., *Tracy*, no. 2329 (NY); same locality, *Tracy*, no. 7682 (G); Ship Island, Harrison Co., June, 1886, *Underwood Herb.* (NY). Louisiana: in pine barrens, Mandeville, St. Tammany Parish, May, 1893, *Langlois* (Mo); west end of Grand Morais near New Iberia, Iberia Parish, *Brown*, no. 6383 (La). Bahamas: edge of fresh-water marsh, Southwest Bay, New Providence, *Britton & Brace*, no. 510 (NY); grows in tufts 5 miles west of Fresh Creek settlement, in a pothole a few rods from shore of a salt creek, Andros, *Wight*, no. 241 (G); pineland swamps, Eight Mile Bay, Abaco, *Brace*, no. 1863 (NY); water holes, West End, Great Bahama, *Brace*, no. 3533 (NY, US); marsh, Glass Window to Harbor Island, Eleuthera, *Britton & Millspaugh*, no. 5395 (NY); water hole, Orange Creek and vicinity, Cat Island, *Britton & Millspaugh*, no. 5781 (NY); Hog Island, *Wilson*, no. 8429 (NY); water hole, Stopper Hill, Crooked Island, *Brace*, no. 4832 (NY). Cuba: edge of coastal swamps, La Coloma, Pinar del Rio, *Ekman*, no. 17835 (NY); pineland ditch, Pinar del Rio City, Pinar del

Rio, *Britton, Britton & Gager*, no. 7250 (NY); in coastal swamps, Playa de Guanimar, Habana, *Ekman*, no. 18314 (G, NY); muddy soil, west coastal savanna, Batabano, Havana, *Britton, Cowell & De La Torre*, no. 13349 (NY, US); in shrubbery, Cienaga de Zapata, Santa Clara, *Ekman*, no. 18372 (US); *Wright*, no. 230 (NY, labeled by Gray "*R. Torreyana* Gray var." and annotated by Britton as "*R. Torreyana* var. *microrhyncha* A. Gray cotype"); *Wright*, no. 3785 (G, NY, US). PUERTO RICO: marsh, Laguna del Tortuguero, *Britton & Britton*, no. 8128 (NY, US).

The more robust specimens of *R. microcarpa* cannot be superficially distinguished from specimens of *R. schoenoides*. The differences between the two species are in their achenes. That of *R. microcarpa* is surrounded by stiffly erect bristles which are shorter than the achene or equal to the tubercle in height. The achene itself is commonly biconvex, castaneous to dark brown, strongly and irregularly alveolate. The achenial bristles of *R. schoenoides* are usually divergent, exceeding the tubercle in height. Unlike the common condition in *R. microcarpa*, the achene is strongly flattened, and pale to castaneous. The alveoli are longitudinally compressed and appear as nearly regular rows of striae between a few prominent transverse ridges.

On the continent, *R. microcarpa* occurs most commonly in Florida with a few collections from North Carolina, southern Georgia, and the coastal areas of Mississippi and Louisiana.

R. schoenoides, on the other hand, occurs on the Coastal Plain from North Carolina to eastern Texas exclusive of the Florida Peninsula.

68. R. TORREYANA Gray. Caespitose: leaves slenderly linear, 2–3 mm. wide, flat or involute on drying, forming a stiff basal tuft; tips triquetrous, with finely serrated margins: culms subterete, slender, becoming flexuous, 0.5–1 m. high: cymes 2–3, decompound, fasciculate, corymbiform, 1–3.5 cm. wide; the filiform branchlets somewhat spreading: spikelets ovoid, 3–6-flowered, 1–5-fruited, pedicellate, mainly ascending, 4 mm. long: scales loosely imbricate, papery, castaneous, aristate: bristles 6, not exceeding ⅔ the achene in height, upwardly serrulate: achene obovate, to oblong-obovate in outline, extremely flattened, with the compressed alveoli appearing as fine glistening striae between the irregular transverse ridges, chestnut-brown, 1–1.2 mm. wide, 1.3–1.7 mm. long: tubercle deltoid, apiculate, compressed, decurrent, scurfy, 0.3 mm. in height. PLATE 834, FIGS. 3A and 3B; MAP 80.—Ann. Lyc. N. Y. iii. 197, pl. 6, fig. 2 (1835); Gray, Man. 532 (1848); Chapman, Fl. So. U. S. 524

(1860); Britton & Brown, Ill. Fl. i. 280, fig. 659 (1896); Britton, Man. 186 (1901); Small, Fl. 197 (1903) and Man. 184 (1933); Robinson & Fernald in Gray, Man. ed. 7: 200, fig. 317 (1908); Fernald, RHODORA, xxxix. 327 (1937). *R. micrantha* sensu Gray, Gram. et Cyp. i. no. 96 (1834), in part[1] and excl. syn. *Phaeocephalum Torreyanum* House, Am. Midland Nat. vi. 202 (1920).—Sandy pond-margins and sandy and peaty depressions in pinelands and savannas of the Coastal Plain from Cape Cod, Massachusetts, to Georgia. MASSACHUSETTS: damp sandy and peaty border of Israel Pond, Barnstable, Barnstable Co., *Fernald*, no. 8958 (G, NE, NY, P); Sconset, Nantucket Island, Nantucket Co., *Bicknell*, no. 1051 (NE, NY). RHODE ISLAND: sandy and gravelly shore of small double pond east of Long Pond, South Kingstown, Washington Co., *Collins & Fernald*, no. 11317 (G, NE). NEW YORK: damp meadow, Amityville, Suffolk Co., *Ferguson*, no. 7873 (G, NY). NEW JERSEY: White Horse, Mercer Co., *Stone*, no. 6756 (P); Quaker Bridge, Burlington Co., Aug. 1833, *Gray* (NY, TYPE); wet sandy clearing in barrens along tracks of C. R. R. of New Jersey, 1½ miles northeast of Atsion, Burlington Co., *Hermann*, no. 3556 (G); boggy swale near headwaters of Cooper Creek, Lindenwold, Camden Co., *Long*, no. 26371 (P); Egg Harbor, Atlantic Co., July 20, 1897, *Lippincott* (G); sandy clayey border of pond-hole, 1½ miles n. n. e. of Olivet, Salem Co., *Long*, no. 47085 (P); moist pine barrens, Swain, Cape May Co., *Mackenzie*, no. 7193 (NY). DELAWARE: Felton, Kent Co., *Canby* (G, P); wet pine barrens near Laurel, Sussex Co., Aug. 5, 1874, *Commons* (P). MARYLAND: wet thickets along Snow Hill Road, 7½ miles southeast of Salisbury, Wicomico Co., *Tatnall*, no. 4371 (G); meadows, Ocean City, Worcester Co., July, 1893, *Canby* (US). VIRGINIA: wet pineland south of Petersburg, Prince George Co., *Fernald & Long*, no. 8609 (G, P); argillaceous and sphagnous bog (Reams Bog) south of Burgess, Dinwiddie Co., *Fernald & Long*, no. 8998 (CU, G, P); sandy and peaty depression (exsiccated shallow pond) about 4 miles northwest of Homeville, Sussex Co., *Fernald & Long*, no. 6076 (G, P); damp clearing in woods along Wakefield Road northeast of Sebrell, Southampton Co., *Fernald & Long*, no. 10547 (G, NY, P); sphagnous bog about 1 mile northwest of Dahlia, Greensville Co., *Fernald & Long*, no. 8609 (G, P). NORTH CAROLINA: dry savanna, 15 miles southeast of Greenville, Pitt Co., *Blomquist*, no. 11229 (D); dry pine woodland at Nashville, Nash Co., *Godfrey*, no. 5155 (D, G); mossy floor of pine woodland, Raleigh, Wake Co., *Godfrey*, no. 4924 (G, NC);

[1] No. 96 was apparently made up from a mixed collection. In the volume belonging to the library of the New York Botanic Garden, no 96 is *R. Torreyana*, as stated by Gray in an appended correction; but in the volume at the Gray Herbarium, no. 96 is *R. gracilenta* Gray.

wet open sand pits, 5 miles west of Swanquarter, Hyde Co., *Wiegand & Manning*, no. 629 (G); savanna at Chocowinity, Beaufort Co., *Godfrey*, no. 5400 (G); pineland at Roseboro, Sampson Co., *Godfrey*, no. 5712 (G); edge of savanna, low ground, Big Savannah, west of Burgaw, Pender Co., *Blomquist*, no. 10067 (CU, D); Wilmington, New Hanover Co., Aug. 19, 1930, *Blomquist* (G); dry sandy soil, Fayetteville, Cumberland Co., *Biltmore Herb.*, no. 5055b (US); damp open sand-pocket, 4 miles north of Hoffmann, Richmond Co., *Wiegand & Manning*, no. 630 (G). South Carolina: low pine woods, common, Society Hill, Darlington Co., *Curtis* (G); Camden, Kershaw Co., *House*, no. 2681 (US); cart-road through pineland clearing, 5 miles south of Andrews, Georgetown Co., *Godfrey & Tryon*, no. 1329 (G, NY); grass-sedge bog or savanna, 1 mile west of Chicora, Berkeley Co., *Godfrey & Tryon*, no. 851 (CU, D, G, NY, P); grass-sedge bog or savanna, 3 miles southwest of Manning, Clarendon Co., *Godfrey & Tryon*, no. 939 (G). Georgia: rather dry pine barrens near Pulaski, Bullock Co., *Harper*, no. 941 (G, NY, US); pine barren at Ways, Bryan Co., *Eyles*, no. 6419 (CU); moist pine barrens west of Ochmalkee, Montgomery Co., *Harper*, no. 1868 (G, NY, US).

69. R. perplexa Britt. ex Small. Caespitose: leaves flat, 1–2 mm. wide, minutely serrulate along the upper margins; tip triquetrous: culms slender, flexuous, obtusely 3-angled, 0.5–1.1 m. high: cymes 1–3, decompound, fasciculate, loosely corymbiform or rarely congested, flexuous, the terminal cyme 2–5.5 cm. high: spikelets ovoid-orbicular, turgid at maturity, 3–5-flowered, 2–4-fruited, 2–2.5 mm. long, usually crowded in a few small ultimate fascicles: scales ferruginous or blackened, broadly ovate, usually blunt or occasionally mucronulate: bristles none, or represented by 1–3 rudiments not equalling ½ the achene in height, these upwardly hispidulous: achene obovate to suborbicular in outline, flattened, 0.9–1.2 mm. wide, 1–1.3 mm. long; the surface crossed by a few prominent transverse ridges which are separated by numerous slender longitudinal striae, castaneous: tubercle broadly deltoid, apiculate, compressed, pale, 0.2–0.3 mm. high. Plate 832, figs. 3A and 3B; Map 81.—Fl. 197, 1328 (1903) and Man. 184 (1933); Fernald, Rhodora, xl. 399 (1938). *R. microcarpa* Baldw., var. *achaeta* E. Hall, Pl. Tex. 25 (1873), *nomen nudum*. *Phaeocephalum perplexum* House, Am. Midland Nat. vi. 202 (1920).—Coastal Plain from southeastern Virginia south to Florida and west to eastern Texas, inland only in central Tennessee; also in western Cuba and southern Dominican Republic. Virginia: exsiccated argillaceous pond-hole in woods, about 1 mile south of Mercy Seat Church, Surry Co., *Fernald & Long*, no. 8989 (G, P); wet peaty depression in pinelands, 3–4 miles northwest of Waverly, Sussex Co., *Fernald &*

Long, no. 8115 (G, P); pond-hole in pine and oak woods near Three Creek, north of Emporia, Greensville Co., *Fernald & Long*, no. 9282 (G, P); in shallow water of flat pineland, Collier's Yard, 2½ miles south of Petersburg, Dinwiddie Co., *Smith & Hodgdon* in Pl. Exsic. Gray., no. 924 (CU, G, NY, P). North Carolina: drained grassy plain, 1 mile east of Delco, Columbus Co., *Wiegand & Manning*, no. 615 (G). South Carolina: common in savannas, Sumter Co., Aug. 4, 1884, *J. D. Smith*, (G, US); exsiccated pine-barren pond, 7 miles southeast from Columbia, Richland Co., Sept. 26, 1883, *J. D. Smith* (G, US). Georgia: swamp, Augusta, Richmond Co., *Ruthbert*, no. 343 (NY); gum-swamp along U. S. Route 17, south of Ways, Bryan Co., *Eyles*, no. 6285 (CU); margin of pond, north of Ludowici, Long Co., *Eyles*, no. 6526 (CU); dry soil, Valdosta, Lowndes Co., May 27, 1940, *Sargent* (Sargent Herb.); wet clay holes, 5 miles west of Tifton, Tift Co., *Svenson*, no. 7087 (G); shallow (now dry) pine-barren pond near Cobb, Sumter Co., *Harper*, no. 1403 (G, NY, US); margin of pond in pine barrens, 7 miles north of Cordele, Dooly Co., *Eyles*, no. 2303 (CU). Florida: *Chapman*, no. 2 (NY, type); swampy places in pine barrens near Jacksonville, Duval Co., *Curtiss*, no. 5178 (G, US); pinelands, Starke, Bradford Co., May, 1923, *Wyman* (NY); prairies near Ft. Shackleford, Big Cypress, Lee Co., *Small*, no. 8352 (NY); Ponce de Leon, Holmes Co., *Curtiss*, no. 6482 (G, NY, US). Alabama: pond, Elberta, Baldwin Co., July 15, 1926, *Wolf* (StB); low wet places, Mobile, Mobile Co., *Mohr*, no. 142 (US). Mississippi: Mississippi City, Harrison Co., *Lloyd & Tracy*, no. 379 (NY). Tennessee: wet open woods bordering a bog north of Manchester, Coffee Co., *Svenson*, no. 9139 (CU, D, G, NY). Louisiana: in pine barrens near Mandeville, St. Tammany Parish, May 1, 1893, *Langlois* (CU, Mo, P, US); Lake Charles, Calcasieu Parish, *Tracy*, no. 4882 (Mo, NY, US). Texas: in a pond three miles below Town Bluff, Tyler Co., *Wright*, no. 102 (G); ponds, Hempstead, Waller Co., *Hall*, no. 710 (G, type of *R. microcarpa* Baldw. ?var. *achaeta* Hall, nomen nudum; Mo, US, isotypes). Cuba: border of lagoon, vicinity of Pinar del Rio City, Pinar del Rio, *Britton, Britton & Gager*, no. 6962 (NY); banks of lagoon, El Punto, east km. 11 of road to La Coloma, south of Pinar del Rio, *Ekman*, no. 18262 (NY. This number cited by Kükenthal as *R. microcarpa* A. Gray). Hispaniola: in the Rhexia belt, near Laguna de los Derramaderos, Sabana Guabatico, prov. Santo Domingo, Llana Costero, Santo Domingo, *Ekman*, no. 13320 (NY. Determined by Kükenthal as *R. microcarpa* A. Gray.).

The description above differs in two important details from the original description which appeared in Small's Flora of the

Southeastern United States. The original reads: "perianth bristles 6" and "achenes biconvex." In his Manual of the Southeastern Flora neither of these statements reoccur. I am inclined to believe that they were erroneously included in the original, probably due to a mixture in the material under study. The type-specimen is clearly *R. perplexa* as described above, the achene being extremely flat, not biconvex, and the bristles 1–3 and rudimentary.

Series 12. **Glaucae** (Clarke), stat nov. Growing in marshy areas, grassy slopes, and open woodland of the West Indies (represented by *R. californica* in the coast ranges of northern California); also in Central and South America and warmer parts of the Old World. Caespitose, rarely depressed: leaves 1.5–3 mm. wide: culms slender to stout, stiffly erect or becoming flexuous: cymes compound or decompound, fasciculate; the branchlets rigidly erect and spreading or flexuous: spikelets sessile, 1–3-fruited: scales loosely imbricated: bristles equalling the achene or exceeding the tubercle, antrorsely serrulate: achenes broadly or slenderly pyriform, a shining yellow-brown or light brown; the surface alveoli reduced to longitudinal striae which are intercepted by transverse corrugations or vague and blurred rugulosities: tubercle deltoid, compressed, often attenuated.—*Rhynchospora*, Series B. *Diplostyleae*, Sect. 5. *Glaucae* Clarke in Urban, Symb. Ant. ii. 106 (1900), in part.

Key to Species in Series Glaucae

Tubercle deltoid-attenuate, well exceeded by the bristles: achene with the transverse rugulosities and fine striae blurred to often nearly smooth.
  Achene 1.4 mm. wide, 2 mm. long; scales caducous: species known only from the coast ranges of northern California. 70. *R. californica.*
  Achene 1.2 mm. wide or less, 1.6 mm. long or less: scales persistent: species not known north of the West Indies.
    Habit coarsely erect: culms 0.6–1.4 m. high: fasciculate cymes loosely decompound, 2.5–4 cm. wide, with slender elongate flexuous branchlets: achene 1–1.2 mm. wide, 1.4–1.6 mm. long. . . . . 71. *R. Marisculus.*
    Habit depressed: culms 0.3–1.2 dm. high: fasciculate cymes decompound, small and congested, 1–1.5 cm. wide with short, stiffly erect or somewhat spreading branchlets: achene 0.9 mm. wide, 1.1 mm. long. . . . . 72. *R. cacuminicola.*
Tubercle deltoid, equalled or slightly exceeded by the bristles: achene corrugate. . . . . 73. *R. rugosa.*

70. R. **californica,** sp. nov. Planta caespitosa: foliis 2–3 mm. latis planis, apice triquetris; marginibus superioribus minutissime dentatis: culmis fere 1 m. longis trigonis tenuibus apicem versus flexuosis: fasciculo terminali decomposito stricto

2 cm. lato aut minus; ultimis glomerulis in ramulis brevibus tenuibus rigidisque gestis; fasciculis lateralibus minoribus; pedunculis longis ascendentibus: spiculis late ovatis, floribus tribus sed cum flore quarto terminali abortivo, dicarpis 4 mm. longis: squamis aristulatis, valde caducis: setis 6–7, antrorse hispidulis tuberculo longioribus basi latioribus et sparse plumosis: achaenio obovato lenticulari biconvexo obscure marginato lucido pallido obscure ruguloso 1.4 mm. lato 2 mm. longo: tuberculo attenuato-deltoideo 1 mm. alto. PLATE 834, FIGS. 1A and 1B; MAP 60.—Marsh in the foothills of the coastal ranges of northern California. CALIFORNIA: Pitkin Marsh, 5 miles north of Sebastopol, Sonoma Co., July 26, 1936, *J. T. Howell*, no. 12679 (G, TYPE; CA, ISOTYPE).

This fine new species was collected and sent to me for study by Mr. John Thomas Howell of the California Academy of Science. Its large pale achene rendered conspicuous by the caducous scales is unmistakable and unique among the species of the United States. The light yellowish surface with the faint blurred rugulosities recalls that of *R. Marisculus* Lindl. et Nees in Mart.; whereas the habit is slighter but not unlike that of *R. rugosa* (Vahl) Gale.

In all probability, if the status of specimens which have been collected in Central and South America as well as in the warmer areas of the Old World and which have been identified as *R. glauca* (*R. rugosa* (Vahl) Gale), be given a much needed revision the relationship of *R. californica* to the Series *Glaucae* could be more clearly defined.

71. R. MARISCULUS Lindl. et Nees. Coarsely caespitose: leaves 2–3 cm. wide, stiffly ascending with attenuated, triangular serrated tips: culms stoutly ascending, 3-angled, leafy, 0.6–1.4 m. high: cymes fasciculate, 1–3, loosely decompound, 2.5–4 cm. wide, flexuous; axillary cymes on ascending exserted peduncles: spikelets lanceolate in outline, loosely organized, 1–4-flowered, 1–2-fruited, 5–6 mm. long: scales lanceolate-aristulate, loosely overlapping, dark brown: bristles 6, upwardly serrulate, finely attenuated, irregularly ascending to spreading and contorted, well exceeding the tubercle in length: achene obovoid, sometimes slenderly so, biconvex with a depressed margin, light yellow-brown, 1–1.2 mm. wide, 1.4–1.6 mm. long; the minute longitudinal striae and transverse rugulosities blurred: tubercle triangular-attenuate, compressed, 1.2–1.8 mm. long. PLATE 835, FIGS. 3A and 3B; MAP 61.—Nees, Linnaea, ix. 297 (1835), *nomen nudum;* Kunth, Enum. ii. 303 (1837), cited as "Sp. mihi

nonnisi nomini notae."; Nees in Mart., Fl. Bras. ii. pars 1: 142 (1842), first valid publication; Boeckeler, Linnaea, xxxvii. 590 (1873); C. B. Clarke in Urban, Symb. Ant. ii. 132 (1900), excl. syn. *R. odorata* C. Wright and *R. jubata* Liebm.; Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 105 (1923); Kükenthal, Fedde Rep. Spec. Nov. xxxii. 77 (1933). *R. tenuiseta* Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 83 (1871) and Fl. Cub. 179 (1873). *R. borinquensis* Britton, Bull. Torr. Bot. Cl. xlii. 387 (1915); Britton, Mem. Soc. Cubana Hist. Nat. ii. 200 (1916); Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 104 (1923). *Dichromena Marisculus* Macbride, Field Mus. Pub. Bot. xi. 5 (1931).—In damp openings of woodland, Greater Antilles. JAMAICA: Guy's Hill, St. Mary's, 1839, *McNab* (G). CUBA: in tembladeras, in a swamp just to the east of Laguna de la Maguina, Pinar del Rio City, Pinar del Rio, *Ekman*, no. 17883 (NY); *Wright*, no. 3780 (G, type of *R. tenuiseta* Wright in Sauvalle; NY, US, isotypes); wet soil among rocks in stream, Arroya del Medio above the falls, Oriente, alt. 450–550 m., *Shafer*, no. 3231 (NY); damp woods near sphagnum, Sierra Nipe near Woodfred, Oriente, alt. 450–550 m., *Shafer*, no. 3453 (NY); in thickets on path from Woodfred to Piedra Gorda, Sierra de Nipe, Oriente, *Ekman*, no. 15247 (US); La Prenda, Oriente, *Hioram & Manuel*, no. 4671 (NY). HISPANIOLA: silt flats, moist ground, Sabana Nueva, Lomas de la Mediania, San Juan, prov. de Agua, Cordillera Central, Santo Domingo, *Ekman*, no. 13601 (G, NY, US); on tembladera, in a laguna, Cuenca, Santo Domingo, Llano Costero, Santo Domingo, *Ekman*, no. 10982 (US). PUERTO RICO: open wet places in forest, Sierra de Naguabo, Rio Icaco and adjacent hills, alt. 465–720 m., *Shafer*, no. 3515 (NY, type of *R. borinquensis* Britt.).

R. jubata Liebm. was confused by C. Wright with his *R. tenuiseta*, and so continued on in the synonymy of *R. Marisculus* by C. B. Clarke. I have examined a specimen of Liebman's from S. Antonio, Huatusco, which is the type-locality as given in Mexicos Halvgraes,[1] and believe it to represent a distinct species. It differs from *R. Marisculus* both in its pronounced lax, more tenuous habit, and in its achene, which is distinctly cencellate and rugulose, surrounded by six stiffly erect bristles that equal but do not exceed the tubercle in length. Proof of this opinion rests, however, on the examination of more Mexican material.

An examination of the New York collections of *R. Marisculus* leads me to believe that *R. borinquensis* Britt. owes its existence

[1] Ibid. 67 (1850).

to Britton's mistaken application of the name *R. Marisculus* Lindl. et Nees to specimens of *R. odorata* Wright.

72. R. **cacuminicola,** sp. nov. Planta humilis caespitosa: foliis 1–2 mm. latis subcoriaceis leviter carinatis; apicem versus serratis triquetris, basi confertis, culmo brevioribus: culmis obtuse triangularibus 0.3–1.2 dm. altis: cyma terminali decomposita; ramulis brevibus rigide erectis vel ascendentibus fasciculis terminalibus parvis confertis; fasciculo laterali approximato; pedunculo ascendenti: spiculis lanceolatis 4–4.5 mm. longis 2–3-floris 1–2-carpis sessilibus congestis: squamis acutis vel fere aristulatis ferrugineis margine erosis: setis 6–7, quam tuberculum multo longioribus antrorse hispidulis: achaenio pyriformi 0.9 mm. lato 1.1 mm. longo lenticulari biconvexo marginato luteo-castaneo, obsolete ruguloso: tuberculo compresso-subulato, attenuato, 1–1.2 mm. longo. PLATE 835, FIGS. 2A and 2B; MAP 62.—Marshy areas in Cordillera Central of the Dominican Republic. DOMINICAN REPUBLIC: in pratis paludosis in valle nuevo, prope Constanza, alt. 2200 m., June, 1910, *Türckheim,* no. 3417 (NY, TYPE).

Von Türckheim's specimen is accompanied by an annotation which implies that this species is only an alpine variety of *R. glauca* Vahl (*R. rugosa* (Vahl) Gale). That it is not a depressed form of *R. rugosa,* however, is attested by the achene which is smaller than that of the latter (0.9 mm. wide, 1–1.1 mm. long as opposed to 1.2–1.3 mm. wide, 1.5–1.7 mm. long), and only obscurely rugulose, with definite but short inconspicuous basal stipe. Also the tubercle of *R. cacuminicola,* unlike the short triangular tubercle of *R. rugosa,* is prolonged, with a subulate tip, and well exceeded by the bristles.

Despite the depressed habit, the reduced stiffened inflorescence and its original reference by von Türckheim to *R. rugosa, R. cacuminicola* seems more closely allied to *R. Marisculus;* for in the surface sculpturing of the achene, the comparative length of the bristles and the shape of the tubercle, its achene is to that of the latter species a faithful although much smaller copy.

I have selected for this plant the epithet, *cacuminicola,* in order to signify its mountainous habitat, originally emphasized by von Türckheim.

73. R. **rugosa** (Vahl), comb. nov. Coarsely caespitose: leaves 1.5–3 mm. wide, coarse, ascending to reflexed, flat, carinate, with trigonous serrated tips: culms triquetrous, stout, erect, somewhat flexuous at the summit, leafy, 0.5–1.3 m. high:

fasciculate cymes 1–3, strict, with stiffly erect or somewhat spreading branchlets, 1–2 cm. high: spikelets acutely ovoid, 4.5–5 mm. long, sessile or subsessile; scales ovate-aristate, rather loosely imbricate, ferruginous: bristles 6, upwardly serrulate, ascending or often divergent, equal to or slightly exceeding the tubercle: achene broadly pyriform, 1.2–1.3 mm. wide, 1.5–1.7 mm. long, lenticular, biconvex, with depressed margins, glistening yellow-brown; the longitudinal surface-striae obscured or nearly obliterated by the transverse broad, flattened, often pale corrugations; the thick persistent stipe 0.3 mm. long: tubercle triangular-subulate, compressed, smooth or somewhat setulose at the base, 0.6–0.8 mm. long. Plate 835, figs. 1A and 1B; Map 63.—*Schoenus rugosus* Vahl, Eclog. Am. ii. 5 (1798). *R. glauca* Vahl, Enum. ii. 233 (1806); Boeckeler, Linnaea, xxxvii. 585 (1873); Britton, Trans. N. Y. Acad. Sci. xi. 91 (1892), excl. syn. *R. pungens* Liebm.; Clarke in Urban, Symb. Ant. ii. 128 (1900), excl. syn.; Britton, Mem. Soc. Cubana Hist. Nat. ii. 199 (1916); Britton & Wilson, Sci. Surv. Porto Rico and Virgin Isl. v. 104 (1923); Kükenthal, Fedde Rep. Spec. Nov. xxiii. 210 (1926). *R. glauca* var. *altior* Kükenthal, Fedde Rep. Spec. Nov. xxxii. 77 (1933). *R. gracilis* sensu Grisebach, Fl. Brit. W. I. 574 (1864), in part, and Cat. Pl. Cub. 243 (1866), in part; C. Wright in Sauvalle, Anal. Acad. Ci. Habana, viii. 84 (1871) and Fl. Cub. 179 (1873); non (Swartz) Vahl. *Dichromena glauca* Macbride, Field Mus. Pub. Bot. iv. 166 (1929).—Mostly on damp open grassy slopes of the Greater Antilles, and of the Island of Dominica; also in South and Central America and Lower Mexico. Cuba: banks of small streams, Loma Ratones, Rio San Sebastian, La Cumbre, north of San Juan y Martinez, Pinar del Rio, *Ekman*, no. 18062 (NY, US). Jamaica: along the trail, Mt. Airy, *Maxon*, no. 852 (US); in the morass, Pedro Morass, Upper Clarendon, alt. 3000 ft., *Harris*, no. 11169 (G, NY, US); on wet hillside, Peckham, Upper Clarendon, alt. 2000 ft., *Harris*, no. 12810 (G, NY, US); amongst grasses in wet hillside pastures, Troy, alt. 2000 ft., *Harris*, no. 12590 (G, NY, US). Hispaniola: eruptive slope, Haut-Piton, Port-de-Paix, Massif du Nord, Haiti, alt. 800 m., *Ekman*, no. 4638 (G, NY, US); Petit Borgne to Mt. Casse, Haiti, alt. 200 ft., *Nash*, no. 558 (NY); grassy mountain trail to Citadel, vicinity of Dondon, Depart. du Nord, Haiti, alt. 400 m., *Leonard*, no. 8643 (US); grassy summit of mountain east of village, vicinity of Marmelade, Depart. du Nord, Haiti, alt. 800 m., *Leonard*, no. 8241a (US); pineland, Lagunas de Cenobi, Moncion, Monte Cristi, Cordillera Central, Santo Domingo, c. alt. 1100 m., *Ekman*, no. 12762 (NY, US). Puerto Rico: in thickets, Las Mesas, near Mayaguez, alt. 350 m., *Holm*, no. 64 (CU), Aguada, *Sintenis*, no. 5742 (US); in graminosis, Lares, *Sintenis*, no. 5901 (G, US); low ground back

of Catano, *Heller*, no. 6410 (CU, NY, US); road from Rio Piedras to Trugillo alto, *Hioram*, no. 806 (NY, US); Cidra, Feb. 28, 1928, *Perkins* (NY); on rock by falls in river, Rio Icaco and adjacent hills, Sierra de Naguabo, *Shafer*, no. 3534 (NY, US). DOMINICA: common in cleared pasturelands on deep rich soils of Milton Estate, ca. alt. 530 m., *Hodge & Hodge*, no. 2608 (G). SOUTH AMERICA: America Meridionali,[1] *Rohr in Vahl Herb.* (G, TYPE-PHOTO).

The species, *Schoenus rugosus*, was published with full description by Vahl in his Eclogae Americanae, ii. 5 (1798). However, when, in the Enumeratio Plantarum of 1806, he transferred the species to *Rhynchospora*, he unfortunately chose to give it a new name, and it appeared as *R. glauca*. The old name, *Schoenus rugosus*, was then given in synonymy, accompanied by the original description and citation, "Habitat in America meridionali. von Rohr". Since the specific name, *rugosa*, is available for use under *Rhynchospora*, the new combination *R. rugosa* (Vahl) Gale takes precedence over *R. glauca* Vahl.

The range of this species has been generally given as warmer regions of both hemispheres. However, the specimens from the East Indies and adjacent continental lands which have been commonly identified as *R. glauca*, are not, I believe, conspecific with the authentic *R. glauca* Vahl (*R. rugosa* (Vahl) Gale) of the West Indies, Central and South America. Although these Asiatic plants are closely related to and have the same general aspect as *R. rugosa*—the coarse growth and strict, compound fascicles with mainly ascending, sessile spikelets in small ultimate clusters—their achenes are larger, more nearly orbicular rather than pyriform, and the surface of the achene is generally castaneous, pitted, and finely ridged, without the prominent yellowish band-like corrugations which characterize the achenes of *R. rugosa*.

The Gray Herbarium isotype of Liebman's[2] *R. pungens*, Mirador, July, bears the annotation *R. glauca* Vahl followed by Britton's initials. The specimen itself is fragmentary and the surface details of the mature achenes are obscured by what appears to be an unnatural whitish coating. However, careful examination seems to indicate that the achenes are normally cancellate to

[1] Probably along the coast of Colombia or of French or Dutch Guiana. See Lamarck, Encycl. Meth. Bot. viii. 754 (1808).

[2] Mexicos Halvgraes, 65 (1850).

nearly smooth, with only a suggestion of transverse rugosity. In addition, the tubercle is plainly spongy and tongue-shaped rather than strongly compressed and triangular-subulate. If these observations can be confirmed through better material, *R. pungens*, although closely related to *R. glauca*, will retain its specific status.

INDEX

New scientific names are printed in full-face type

Cephaloschoenus, 91
Ceratoschoenus, 91
Cladium, 90
Cyperaceae, 91, 92, 95, 97, 246

Dichromena, 94, 102; alba, 121; cymosa, 245; distans, 191; glauca, 276; Marisculus, 274

Eleocharis, 119; tuberculosa, 92

Phaeocephalum, 101, 102; album, 121, var. macrum, 124; axillare, 108, Baldwinii, 181; brachychaetum, 164; caducum, 261; capillaceum, 126, var. levisetum, 128; Chapmanii, 168; ciliatum, 160; compressum, 237; Curtisii, 172; cymosum, 245; decurrens, 264; distans, 191; dodecandrum, 228; Earlei, 233; fasciculare, 189; filifolium, 174; fuscum, 170; glomeratum, 113, var. minus, 115; gracilentum, 183; Grayi, 231; inexpansum, 257; intermedium, 130; Knieskernii, 126; leptorhynchum, 179; microcarpum, 266; miliaceum, 257; mixtum, 262; pallidum, 166; patulum, 266; perplexum, 270; Plankii, 233; plumosum, 131; proliferum, 262; punctatum, 238; rariflorum, 208; schoenoides, 265; solitare, 161; stipitatum, 259; Torreyanum, 269
Pleurostachys, 102
Psilocarya, Sect. ii. Pauci-Nucigerae, 134

Rhynchospora, subg. Diplostylis, 92, 102; subg. Distylis, 102; subg. Eurhynchospora, 95; ii. subg. Eurhynchospora, 102; 3. Communes, 102; ii. Dichostyleae, 102; V. Glomeratae, 104, 169, 177, 207, 227, 236, 255; III. Pusillae, 134; § Euriochaete, 128; sect. Eurhynchospora, 89, 91–93, 95, 101, 102, 168, 195; sect. Microchaeta, 93, 217; Dichostyleae, 94; Haplostyleae, 94; ser. B. Diplostyleae, 95, 102, Divisio 4, 134, Divisio 5. Eu-Rhynchospora, 102, Divisio 5. Eu-Rhynchospora, Sect. iii. Fuscae, 227; ser. B. Diplostyleae, sect. 3. Albae, 95, 104, sect. 4. Fuscae, 95, 169, 178, 207, sect. 5. Glaucae, 95, 211, 224, 236, 255, 272, sect. 2. Plumosae, 95, 128; ser. Albae, 117–119; ser. **Caducae,** 97, 100, 104, **255**; ser. **Cernuae,** 93, 96, 98, 100, 103, **211,** 220; ser. **Chapmaniae,** 95, 99, 100, 103, **134,** 159; ser. **Cubenses,** 100, 103, **224**; ser. **Fasciculares,** 103, **177,** 178; ser. **Fuscae,** 99, 100, 103, **169**; ser. **Glaucae,** 100, 104, **272,** 273; ser. **Globulares,** 100, 104, **236**; ser. Glomeratae, 95, 99, 100, 103, 104; ser. **Harveyae,** 99, 100, 104, **227**; ser. Plumosae, 99, 100, 103, 128; ser. **Rariflorae,** 100, 103, **207**; group Capitatae, 92, 94; group Communes, 92; group Corymbosae, 94; group Longirostres, 92; alba, 89, 94, 95, 98, 104, 105, 120, 121, 123–125, 128, pl. 819, β. fusca, 89, 170, f. **laeviseta, 123,** var. macra, 95, 121, 124, 125, var. meridianus, 123; axillaris, 106, 108, var. microcephala, 95, 106; bahamensis, 223; Baldwinii, 91, 132, 178, 181, pl. 825; Berterii, 214; Blauneri, 164, 165; borinquensis, 274; brachychaeta, 94, 95, 103, 132, 159, 164, 165, 168, 185, 187, 188, pl. 822; "brachychata", 164; brevirostris, 216; **Brittonii,** 237, 239, **241, pl. 831**; **cacuminicola,** 239, 272, **275, pl. 835**; caduca, 90–92, 94, 100, 239, 256, 259, 260, pl. 833; **californica,** 239, **272, pl. 834**; capillacea, 98, 105, 119, 126–128, 132, 219, pl. 818, f. leviseta, 119, 127, 128, var. leviseta, 119, 128; capitellata, 89, 91, 95, 105, 115, 117–121, pl. 819, f. **controversa, 119,** 121, var. controversa, 119; capitellata, f. **discutiens,** 99, 116, 117, **119,** 121, 127, var. discutiens, 119, var. leptocarpa, 115, var. minor, 115; cephalantha, 91, 105, 107–109, 111, 119, 120, var. **attenuata,** 108, **110,** 111, 120, var. microcephala, 111, var. pleiocephala, 108, 109, 111, 120, f. **controversa, 110,** 121, var. typica, 98, 108, 111, 120, pl. 818,

f. **antrorsa, 109,** 121; cephalotes, 93; cephalotoides, 93; cernua, 93, 186, 212, 214, 216, 217, pl. 826; chalarocephala, 105, 111, 120, pl. 818; Chapmanii, 99, 102, 132, 159, 164, 165, 167, 168, pl. 821; ciliaris, 89, 92, 97, 98, 132, 134, 159, 161, pl. 822; ciliata, 89, 92, 160; compressa, 95, 99, 100, 236, 237, 239, pl. 830; conferta, 168; corniculata, 91; **crinipes,** 132, 170, **173,** 174, **pl. 823; crispa,** 97, 186, 212, **213**–215, **pl. 827**; cubensis, 93, 96, 186, 224–227, pl. 828, var. stenophylloidea, 226; **culixa,** 104, 186, 228, **235,** 236, **pl. 828;** Curtisii, 93, 132, 166, 170–172, pl. 823; cymosa, 95, 113, 242, 245–248, var. compressa, 237, var. globularis, 244, 248; **debilis,** 103, 178, 186, 188, **194**–196, **pl. 826;** decurrens, 256, 259, 264, pl. 832; deflexa, 93, 162, 163, 190, 225; **depressa,** 186, 212, **217,** 218, pl. 826; distans, 89, 95, 162, 177, 191–193, 196, 230, 232, 247, var. β., 185, var. β. fascicularis, 188, var. fascicularis, 192, var. γ. gracillima, 187, var. microcarpa, 176, 177, var. tenuis, 187; divergens, 165; dodecandra, 91, 228–230; dommucensis, 191, 192; Drummondiana, 183, 184; Earlei, 233–235; Edisoniana, 234, 266, 267; Elliottii, 91, 92, 117, 231, 232, 265; etuberculata, 92; fascicularis, 89, 95, 118, 162, 163, 165, 178, 188, 190, 192, 193, 195, var. distans, 89, 176, 177, 182, 183, 186, 187, 191, 193, 195, 196, pl. 825, var. stenophylla, 164, 165, var. trichoides, 194, 196, var. **typica,** 103, 162, 186, **188,** 191, 193, 196, 225, pl. 825; **Fernaldii,** 103, 132, 178, **182, pl. 825;** fibrillosa, 216; filifolia, 91, 99, 132, 170, 172–174, 176, 177, pl. 822, var. pleiantha, 171; foliata, 92; fusca, 89, 96, 132, 169–172, 176, 183, pl. 824; fuscoides, 95, 132, 169, 170, 175–177, pl. 822; Gageri, 132, 177, 178, 180, pl. 824; glauca, 89, 93, 117, 118, 273, 275–278, var. altior, 276; globularis, 98, 237, 240, 243, 244, 248, 249, var. **pinetorum,** 236, 239, 243, **248,** pl. 831, var. **recognita,** 93, 95, 235, 236, 239, 242, 243, **245,** 248, 249, pl. 831, var. **typica,** 239, 240, 243, **244,** 245, 248, pl. 831; glomerata, 89, 91, 105, 112, 113, 115, 116, 119, 247, var. **angusta,** 113, **114,** 120, var. discutiens, 95, 119, var. leptocarpa, 115, var. minor, 95, 115, 119, f. controversa, 119, f. discutiens, 119, var. paniculata, 113, β. robustior, 113, var. **typica, 113**–115, 120, pl. 819; gracilenta, 91, 95, 177–179, 183–186, 269, pl. 826, var. diversifolia, 183, 185; gracillima, 164, 185, 187; gracilis, 93, 179, 245, 266, 276; Grayana, 125, 126, 168; Grayii, 91, 92, 117, 118, 126, 186, 228, 230, 232, pl. 829; Harperi, 99, 132, 170, 173, pl. 823; Harveyana, 245; Harveyi, 186, 228, 232–236, 245, pl. 829; inexpansa, 89, 96, 239, 255, 256, pl. 833; intermedia, 128, 130–132, pl. 820; involuta, 266; joveroensis, 132, 178, 180, pl. 824; jubata, 259, 274; Knieskernii, 100, 105, 125, 132, pl. 819; leptocarpa, 115; leptoyrhncha, 94, 95, 98, 132, 173, 177–179, pl. 824, var. laevirostris, 179; Lindeniana, 93, 95, 212, 217–219, 222, 223, var. **bahamensis,** 186, 218, 222, **223,** 224, pl. 827, var. depressa, 217, var. **typica,** 186, 218, **222**–224, pl. 827; lingulata, 215; longifrons, 181, var. reducta, 180, var. β. reducta, 180; longiseta, 92; lunata, 95; luquillensis, 121, 123; macra, 98, 105, 121, 124, 125, 132, pl. 820; macrostachya, 91; Marisculus, 239, 259, 272–275, pl. 835; megalocarpa, 91, 92, 96, 100, 126, 227–230, 235, pl. 829; micrantha, 269; microcarpa, 91, 104, 234, 241, 255, 256, 259, 266, 268, 271, pl. 832, var. achaeta, 270, 271; microcephala, 95, 105, 111, 115, 120, pl. 818; microseta, 92; miliacea, 89, 91, 93, 96, 97, 104, 239, 255, 257, 263, pl. 833; mixta, 256, 259, 262–264, pl. 832; ?monostachya, 92; multiflora, 91, 265; nipensis, 186, 211, 212, 215, pl. 826; **nuda,** 99, 100, 102, 132, 159, **167,** 168, **pl. 821; obliterata,** 237, 239, **242,** 243, **pl. 830;** odorata, 93, 98, 179, 239, 255, 258, 274, 275, pl. 833; oligantha, 91, 128, 130, var. **breviseta, 129,** 132, **pl. 821,** var. **typica, 129,** 132, pl. 821; pallida, 93, 95–98, 132, 159, 161, 162, 164–166, 187, 188, pl. 821; paniculata, 91, 113; patula, 91, 261, 262, 266; penniseta, 93, 131; perplexa, 99, 255, 256, 259, 266, 270, 272, pl. 832;

pineticola, 130; pinetorum, 248, 249; Plankii, 233; **pleiantha,** 132, **170,** 171, 172, pl. 823; plumosa, 90, 91, 93–95, 97, 128, 131, 132, pl. 820, var. intermedia, 130; prolifera, 262, 263; pruinosa, 93, 97, 186, 211, 212, 221, pl. 826; punctata, 90, 236, 238, 239, pl. 830; pungens, 276–278; pusilla, 214, 215; pycnocarpa, 91, 92, 228–230; Randii, 220, 221; Rappiana, 160, 161; rariflora, 90, 93, 103, 186, 207, 210, 211, pl. 828; **rugosa,** 93, 239, 272, 273, **275,** 277, pl. 835; saxicola, 236, 238–240, pl. 830; scabrata, 93, 97, 186, 212, 213, 220, 221, var. **laevifolia,** 186, 221, **222,** var. **typica, 220,** 222, pl. 827; schoenoides, 90, 99, 256, 259, 265, 268, pl. 834; semiplumosa, 91, 131, 134; setacea, 93, 126, 208, 219; Shaferi, 186, 212, 215, pl. 827; Smallii, 119; **sola,** 132, 159, **162**–164, **pl. 820;** solitaria, 96, 132, 134, 159, 161–164; sparsa, 89, 91, 96, 257; stenophylla, 165, 186, 207, 210, 211, 219, 220, var. albescens, 219; **stenophylloidea,** 96, 186, 224–**226,** pl. 828; stipitata, 259; **sulcata,** 100, 236, 239, **240**–242, **pl. 831;** tenuifolia, 93, 99, 100, 186, 210, 212, 218–220; tenuis, 185; tenuiseta, 274; tetrandra, 179; Torreyana, 91, 234, 245, 256, 259, 268, 269, pl. 834, var., 268, var. microrhyncha, 266, 268; trichodes, 194, 196; trichophylla, 183, 185; Wrightiana, 163, 165, 178, 185–188, 195, 196, pl. 825

Rhynchosporeae, 94, 102

Rhynchosporoideae, 246

Schoenus, 89, 90, 246, 247, 257; albus, 121; axillaris, 108; capitatus, 90; capitellatus, 115–119; ciliaris, 90, 131, 160; cymosus, 90, 92, 113, 245–248; distans, 191–193, 231, 232; fascicularis, 118, 188, 192, 193; fuscus, 170, 231, 232; glomeratus, 113; inexpansus, 256; miliaceus, 91, 257, 258; rariflorus, 90, 208; rugosus, 89, 276, 277; setaceus, 90, 126; sparsus, 257, 258; umbellatus, 248

Scirpus, 90, 119; leptolepis, 92; polyphyllus, 246–248; schoenoides, 91, 265

Triodon, 101; albus, 121, var. macer, 124; capillaceus, 126; glomeratus, 113

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Rhynchospora chalarocephala: fig. 1A, portion of inflorescence, × 2; fig. 1B, achene, × 20.

R. capillacea: fig. 2A, portion of inflorescence, × 2; fig. 2B, achene, × 20.

R. microcephala: fig. 3A, portion of inflorescence, × 2; fig. 3B, achene, × 20.

R. cephalantha var. typica: fig. 4A, portion of inflorescence, × 2; fig. 4B, achene, × 20.

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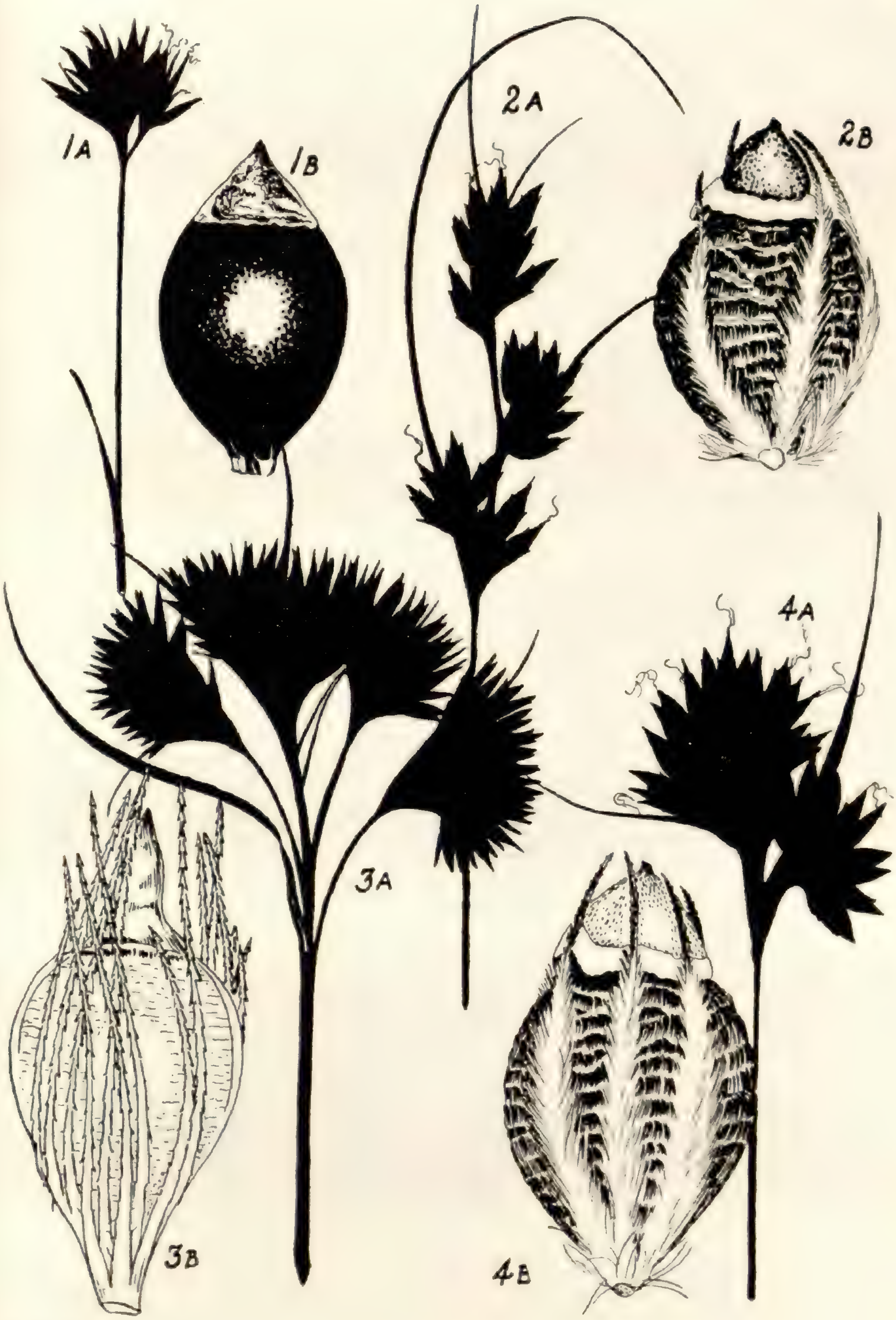
RHYNCHOSPORA GLOMERATA var. TYPICA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.

R. KNIESKERNII: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.

R. CAPITELLATA: FIG. 3A, inflorescence, × 2; FIG. 3B, achene, × 20.

R. ALBA: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.



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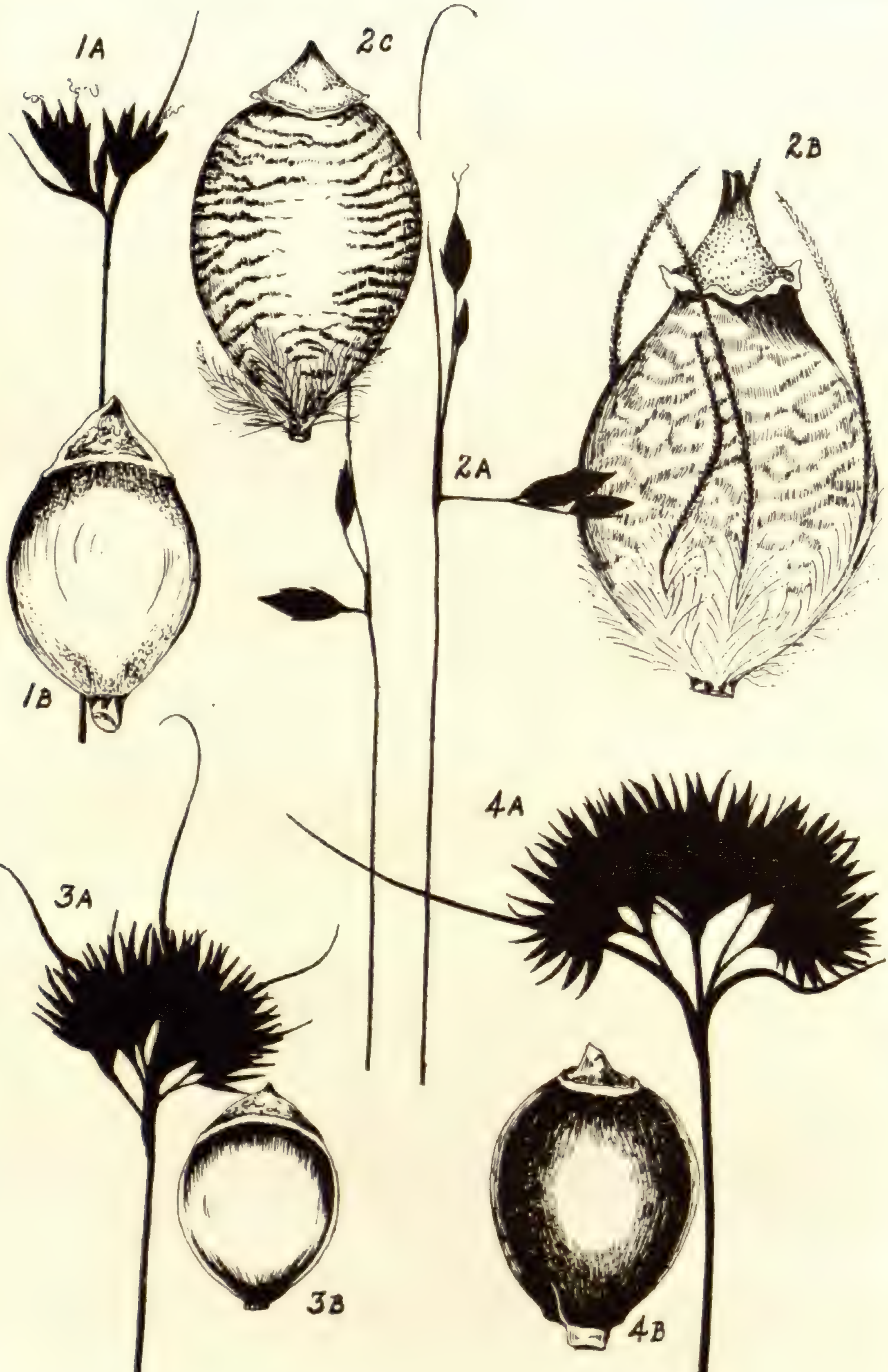
RHYNCHOSPORA SOLA: FIG. 1A, inflorescence, × 2; FIG. 1B, achene, × 20.
R. PLUMOSA: FIG. 2A, inflorescence, × 2; FIG. 2B, achene, × 20.
R. MACRA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.
R. INTERMEDIA: FIG. 4A, inflorescence, × 2; FIG. 4B, achene, × 20.



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RHYNCHOSPORA NUDA: FIG. 1A, inflorescence, × 2; FIG. 1B, achene, × 20.
R. OLIGANTHA, var. TYPICA: FIG. 2A, inflorescence, × 2; FIG. 2B, achene, × 20.
R. OLIGANTHA, var. BREVISETA: FIG. 2C, achene, × 20.
R. CHAPMANII: FIG. 3A, inflorescence, × 2; FIG. 3B, achene, × 20.
R. PALLIDA: FIG. 4A, inflorescence, × 2; FIG. 4B, achene, × 20.

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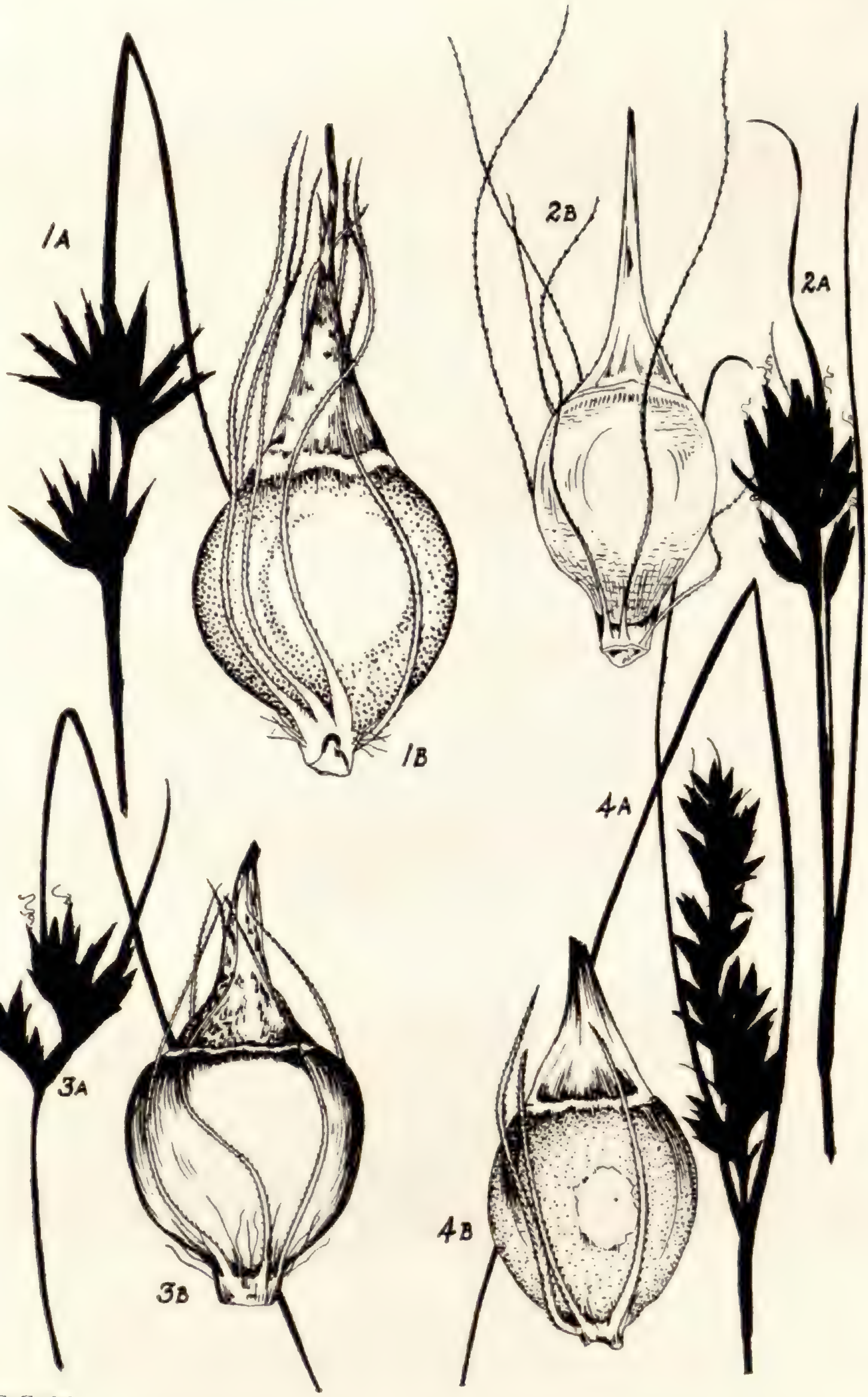
RHYNCHOSPORA BRACHYCHAETA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.
R. CILIARIS: FIG. 2A, inflorescence, × 2; FIG. 2B, achene, × 20.
R. FILIFOLIA: FIG. 3A, inflorescence, × 2; FIG. 3B, achene, × 20.
R. SOLITARIA: FIG. 4A, inflorescence, × 2; FIG. 4B, achene, × 20.
R. FUSCOIDES: FIG. 5A, inflorescence, × 2; FIG. 5B, achene, × 20.

S. G. del.

RHYNCHOSPORA HARPERI: FIG. 1A, inflorescence, × 2; FIG. 1B, achene, × 20.
R. CRINIPES: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.
R. CURTISSII: FIG. 3A, inflorescence, × 2; FIG. 3B, achene, × 20.
R. PLEIANTHA: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.



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RHYNCHOSPORA LEPTORHYNCHA: FIG. 1A, inflorescence, × 2; FIG. 1B, achene, × 20.
R. FUSCA: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.
R. GAGERI: FIG. 3A, inflorescence, × 2; FIG. 3B, achene, × 20.
R. JOVEROENSIS: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.

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RHYNCHOSPORA FASCICULARIS, var. TYPICA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.

R. FASCICULARIS, var. DISTANS: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.

R. FERNALDII: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.

R. BALDWINII: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.

R. WRIGHTIANA: FIG. 5A, portion of inflorescence, × 2; FIG. 5B, achene, × 20.

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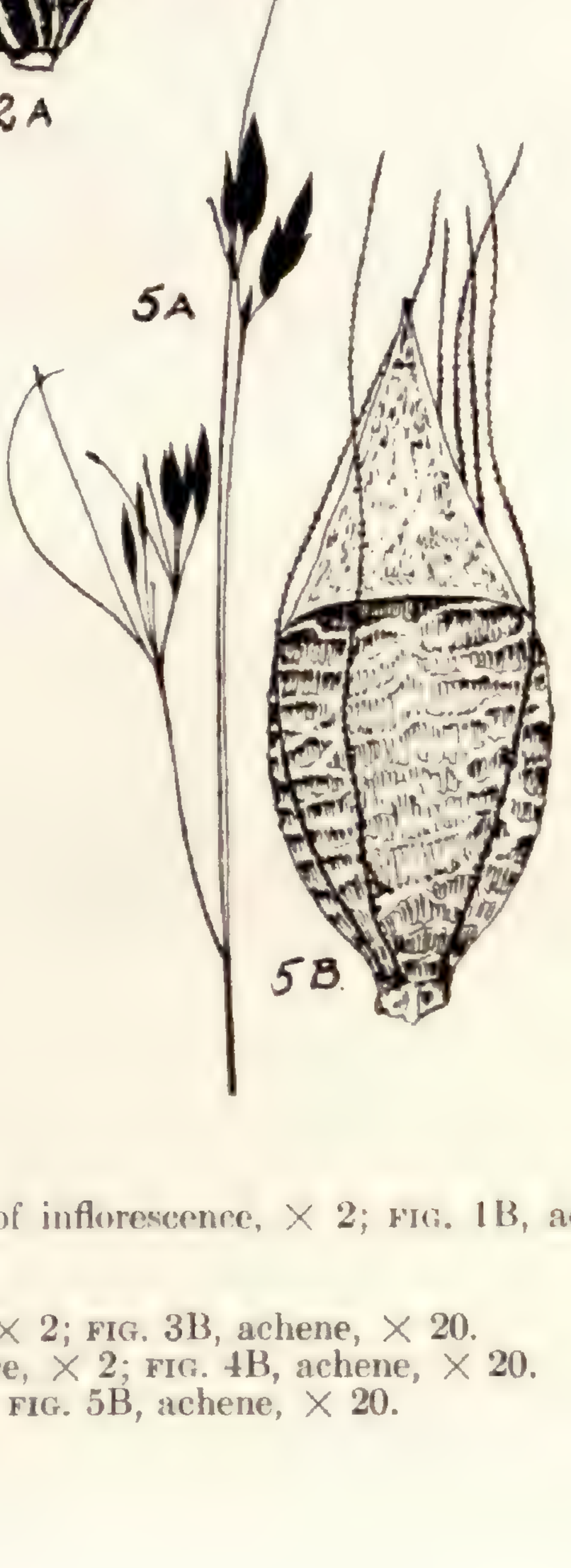
RHYNCHOSPORA DEPRESSA: FIG. 1A, inflorescence, × 2; FIG. 1B, achene, × 20.
R. CERNUA: FIG. 2A, inflorescence, × 2; FIG. 2B, achene, × 20.
R. PRUINOSA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.
R. NIPENSIS: FIG. 4A, inflorescence, × 2; FIG. 4B, achene, × 20.
R. DEBILIS: FIG. 5A, inflorescence, × 2; FIG. 5B, achene, × 20.
R. GRACILENTA: FIG. 6A, portion of inflorescence, × 2; FIG. 6B, achene, × 20.

S. G. del.

RHYNCHOSPORA TENUIFOLIA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.
R. SHAFERI: FIG. 2A, inflorescence, × 2; FIG. 2B, achene, × 20.
R. SCABRATA: FIG. 3A, inflorescence, × 2; FIG. 3B, achene, × 20.
R. CRISPA: FIG. 4A, inflorescence, × 2; FIG. 4B, achene, × 20.
R. LINDENIANA, var. TYPICA: FIG. 5A, portion of inflorescence, × 2; FIG. 5B, achene, × 20.
R. LINDENIANA, var. BAHAMENSIS: FIG. 5C, achene, × 20.



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RHYNCHOSPORA CUBENSIS: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.
R. STENOPHYLLOIDEA: FIG. 2A, achene, × 20.
R. CULIXA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.
R. RARIFLORA: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.
R. STENOPHYLLA: FIG. 5A, inflorescence. × 2; FIG. 5B, achene, × 20.

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RHYNCHOSPORA MEGALOCARPA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.

R. HARVEYI: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.

R. GRAYII: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.

S. G. del.

RHYNCHOSPORA COMPRESSA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.

R. PUNCTATA: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.

R. SAXICOLA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.

R. OBLITERATA: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.

S. G. del.

RHYNCHOSPORA GLOBULARIS, var. TYPICA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.

R. BRITTONII: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.

R. SULCATA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.

R. GLOBULARIS, var. RECOGNITA: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.

R. GLOBULARIS, var. PINETORUM: FIG. 5A, achene, × 20.

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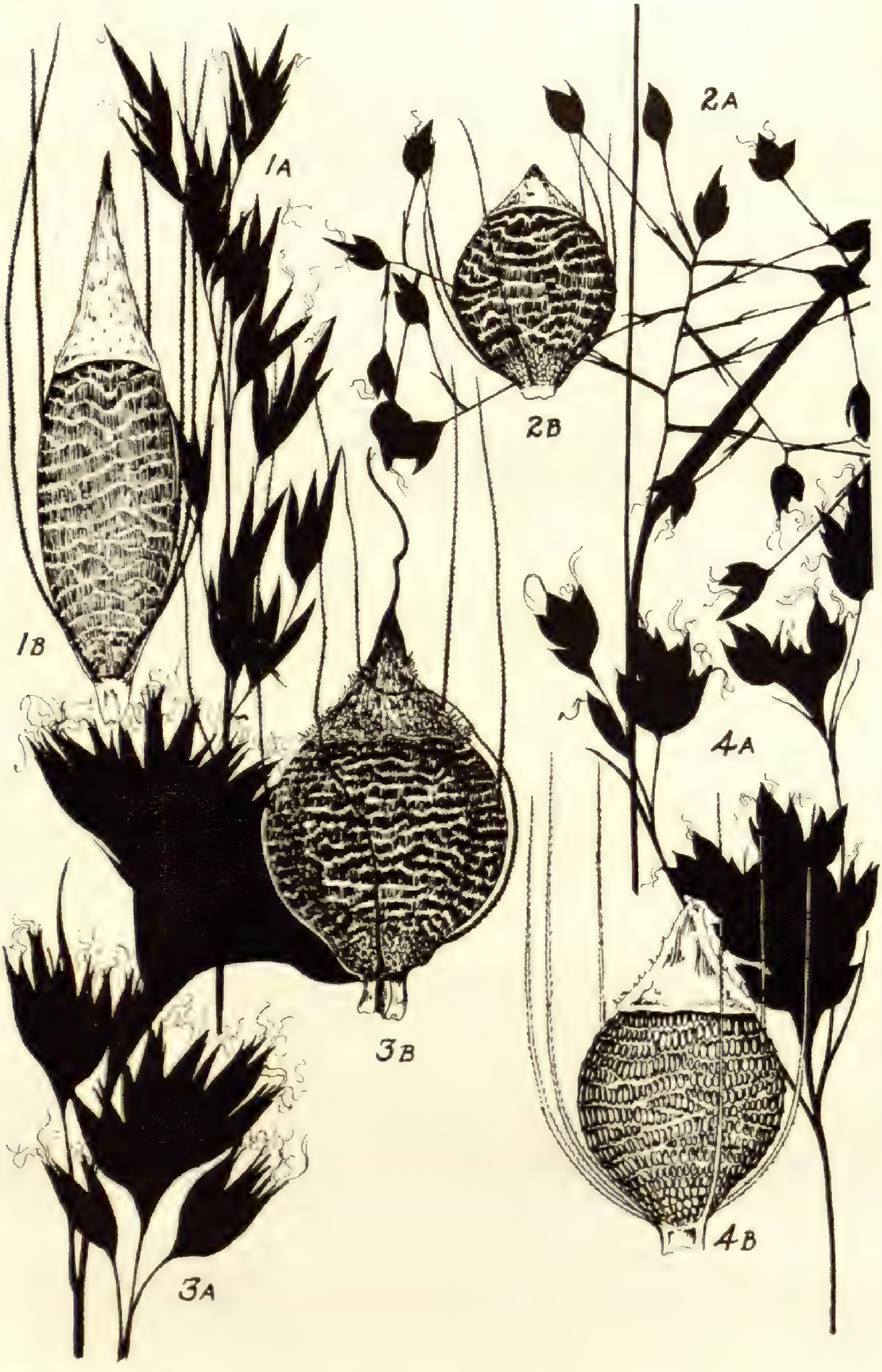
RHYNCHOSPORA DECURRENS: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.
R. MICROCARPA: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.
R. PERPLEXA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.
R. MIXTA: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.



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RHYNCHOSPORA INEXPANSA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.
R. MILIACEA: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.
R. ODORATA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.
R. CADUCA: FIG. 4A, portion of inflorescence, × 2; FIG. 4B, achene, × 20.

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RHYNCHOSPORA CALIFORNICA: FIG. 1A, portion of inflorescence, × 2; FIG. 1B, achene, × 20.
R. SCHOENOIDES: FIG. 2A, portion of inflorescence, × 2; FIG. 2B, achene, × 20.
R. TORREYANA: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.

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RHYNCHOSPORA RUGOSA: FIG. 1A, inflorescence, × 2; FIG. 1B, achene, × 20.
R. CACUMINICOLA: FIG. 2A, inflorescence, × 2; FIG. 2B, achene, × 20.
R. MARISCULUS: FIG. 3A, portion of inflorescence, × 2; FIG. 3B, achene, × 20.

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CLII

AMERICAN THALICTRA AND THEIR OLD WORLD ALLIES

Bernard Boivin

Dates of Issue

Pages 337–377 . . . . . 11 October, 1944
Pages 391–445 . . . . . 9 November, 1944
Pages 453–487 . . . . . 16 December, 1944

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLII

AMERICAN THALICTRA AND THEIR OLD WORLD ALLIES

BERNARD BOIVIN

A WORLD-MONOGRAPH of this genus was published in 1885 by J. C. Lecoyer in the Bulletin de la Société Royale de Botanique de Belgique (**24:** 78–324. 1885) and reprinted under the title *Monographie du genre Thalictrum.* It contains a history of the genus from Dioscorides to 1885. This need not be repeated here; I will, however, sketch the highlights of the history of our knowledge of the American species.

HISTORY OF THE GENUS

Cornut described in 1637 a *Thalictrum canadense*, which, as will be shown later, was not an American species. Morrison in 1715 reported the first three species from the Eastern United States and Canada, but the names he proposed were not validated by later authors and it is not surely known what species he had. He also clearly described a European species, *T. alpinum* L., which was to be first found in America on Newfoundland by Banks in 1766. Again, in 1739, Gronovius in his Flora Virginica proposed two American species and, in the first edition of the Species Plantarum, Linnaeus validated Cornut's species under the name *Thalictrum Cornuti* and described *T. alpinum*, *T. dioicum* and *T. purpurascens.* Aiton in 1789 described from

cultivated specimens a *Thalictrum rugosum*, purportedly an American species, but Lecoyer (l. c. 311), who saw the type of it along with material cultivated in many botanical gardens, made it a synonym of *Thalictrum glaucum* Desf., a European species. About 1790, Muhlenberg wrote a Flora Lancastriensis which was never published but which contained descriptions of two new species, *T. polygamum* and another species, the first of which was validated in 1825. The manuscript of this flora is at the Gray Herbarium. Michaux (Fl. Bor.-Am. **1:** 322) described *T. laevigatum* in 1803. De Candolle's Systema in 1817 recognized eight species and four varieties for North America, one species for Mexico and four for South America. To these was added *T. peltatum* DC. in the Prodromus, vol. 1, published 7 years later.

From 1824 on there was to be no synoptical treatment of the South and Central American species of *Thalictrum*, though there was a large amount of work done upon the North American species. Hooker in 1829 accepted 4 species in his Flora Boreali-Americana, Torrey & Gray's Flora of North America included 6 species and Sereno Watson listed thirteen species and three varieties in his Bibliographical Index (1878). The same year Lecoyer published a preliminary paper and seven years later in his world-monograph of the genus he attributed twelve species to North America, seven to Central America and three more to South America, in all twenty species and one variety for the Americas. A year later, in 1886, Trelease, working at the time at the Gray Herbarium, published a monograph of the North American *Thalictra*, recognizing twelve species and three varieties.

For the next 25 years the history of this genus was to be dominated by E. L. Greene, who described as new forty-five species and seven varieties of *Thalictrum*. He also left many unpublished names on herbarium sheets in various herbaria. By the time this was over, there existed such a confusion in the taxonomy of this genus that most local floras cautiously followed and still follow more or less the posthumously published treatment by Gray in his Synoptical Flora of North America in 1895, in which thirteen species and four varieties were accepted. J. N. Rose started in 1899 to monograph the Central American and Mexican *Thalictra* but only part of this work was carried through

and published. By the end of 1942, about 165 specific names had been proposed to designate American *Thalictra*, 40 of them for species restricted to areas south of the United States-Mexican boundary.

Value of Descriptive Characters

Height of the Plant. Quite variable in tall species, more constant in smaller ones. *T. rhynchocarpum* Dill. & Rich. of the southern Cameroon Mountains and Fernando Po Island may reach a height of 4 meters.

Pubescence. Extremely useful characters are those based on pubescence; for no matter whether the plant is male or female, whether it is in flower or in fruit, accurate descriptions of the pubescence always apply and can easily be checked no matter how fragmentary the specimen may be. Many normally pubescent species do, however, occasionally present glabrous specimens and mature foliage often loses its pubescence, but the reduced leaves in the upper part of the inflorescence will retain it, at least up to the full maturity of the fruits. Hairs in this genus are either unicellular or multicellular. Furthermore, multicellular hairs may be uniseriate or multiseriate. Unicellular and uniseriate hairs are normally translucent. Capitate hairs are either unicellular or multicellular; all other types are multicellular. Capitate hairs are always very small so that a good binocular may be pretty useful to anybody attempting to identify a *Thalictrum*, but this type of hair usually exudes a fetid and sticky substance *in vivo*. Multiseriate hairs are usually opaque, often whitish and sometimes diversely colored. They may either be stiff, short and blunt or long (1 mm. or more), undulate and attenuate. Short blunt multicellular hairs always render the plant scabrous. In one species, *T. inuncans* nostrum, small hooked prickles are present all over the plant. In another, *T. Standleyi* Steyermark, the hairs are stellate, stipitate, and of a brownish color. This species is also the most fetid of all.

Thus there are six types of hair, all easily recognizable either by the naked eye, the hand-lens or the binocular, e. g.: *capitate hairs*, *uniseriate flexuous hairs*, *short multiseriate hairs*, *long attenuate multiseriate hairs*, *small prickles* and *stellate hairs*. Within the same species hairs of only one of those types are usually present, or none at all; rarely the same plant will have

hairs of two or three different types. Such a good character has usually been overlooked in the past, thus rendering absolutely impossible the exact interpretation of many a name.

Leaf. An arbitrary distinction has been made between the leaves according to whether they are attached close to or at the base of the stem, whether they are scattered along the lower unbranched half of the stem or whether they subtend a primary branch of the inflorescence. They are respectively termed *folia radicalia*, *folia caulinaria* and *folia inflorescentiae*.

Leaf-division. Contrary to pubescence, the type and degree of division of the leaf is usually widely variable and was usually stressed by describers of new species. Only rarely does the leaf furnish any specific character, although each species, when well known, may usually be recognized by the contour of the leaflets. But these differences are not constant and not very easily put into words. In most cases leaves vary from 3- to 5-ternate; basal leaves are usually more divided than cauline leaves. Lower branches of the inflorescence are in many species subtended by 1–3-ternate leaves, sometimes by simple reduced ones. Only rarely will the secondary branches of the inflorescence, or even the pedicels, be subtended by leaves, as in *T. sparsiflorum* Turcz. and *T. Hultenii* nostrum.

Petiole and Petiolules. Their length is extremely variable and of little taxonomic value. However, some species, e. g. *T. dioicum* L., are characterized by having the lower branch of the inflorescence subtended by a long-petioled leaf. The base of the petiole is always more or less dilated. Even when the leaf is said to be sessile it is not truly sessile, for this dilated part of the petiole is always present between the stem and the leaf. Not uncommonly this base of the petiole surrounds the stem nearly completely.

Stipules and Stipellules. The dilated base of the petiole is sometimes so much enlarged that its margins may properly be termed stipules. Such stipules are not constantly present nor is their size or contour of any taxonomic value in most American species. Stipellules are always absent in some groups, while in many a species, e. g. *T. Fendleri* Gray, their form and size are inconstant. Stipellules of the first degree are most common but those of the second or third or even the fourth degree may be

encountered. In most North American species stipellules are regularly lacking.

Root. Roots are commonly fibrous, but in a few species they tend to be more or less tuberous, e. g. *T. texanum* (Gray) Small, *T. debile* Buckley and *T. pinnatum* Watson. A few species, e. g. *T. confine* Fern., may have horizontal underground stolons which will at their end produce a stem the following year, for all species of *Thalictrum* are perennial. The general condition is a stem simply thickened at the base, and from that thickened base all the roots depart and there also is produced the bud for the stem of the following year.

Inflorescence. The inflorescence is usually paniculate, sometimes subcorymbose, e. g. *T. polygamum* Muhl. var. *hebecarpum* Fern., or racemose, e. g. *T. alpinum* L. Except for the latter all *Thalictra* have a more or less branched inflorescence but are otherwise simple, there being only one inflorescence to a plant. An exception to this is *T. madrense* Rose which has no definite inflorescence but is branched from the base, with solitary flowers or short panicles at the end of each branch. *T. occidentale* Gray var. *palouense* St. John sometimes has a simple raceme of mostly geminate peduncles. A few species are pauciflorous or uniflorous.

Peduncles. In most species peduncles are quite variable but in a few they will present very constant characters. They are shortest in *T. venulosum* Trel., longest in § Cincineria, arching in *T. alpinum* L., or strongly recurved below the receptacle in *T. sparsiflorum* Turcz., *T. grandifolium* Watson and others.

Perianth. In the subgenus *Lecoyerium* the perianth is typically of 4 sepals. These are usually small and fugacious, more or less oval in contour, and a few millimeters in length; they are of little taxonomic importance. However, in the § *Heterogamia* they are dimorphous, those of the pistillate flowers being much smaller and narrower than those of the staminate flowers. As to their color, they are usually greenish at first, then more or less purplish, and generally withered by the time they drop off.

Sex of Plants and Flowers. All species of *Thalictrum* have perfect flowers except for those of the subgenus *Lecoyerium* in which the flowers may be dioecious, polygamous or perfect, according to the different sections of that subgenus.

Stamens. The color and shape of the filament also characterize the different sections. The exact color of the filament is unknown for many species from Mexico and southward. In some groups the filament is upwardly dilated or clavate, e. g. § *Leucocoma* and § *Physocarpum*. The length of the filament and the anther varies within definite limits for each species; thus it is helpful in identification. The anthers also have a definite shape, from linear to globose, and may be obtuse at the apex or with a more or less well developed acumen. Anthers are usually yellow and give its mass color to the staminate inflorescence. In the § *Leucocoma* the filaments may be responsible for this mass effect. As a rule anthers and sepals will completely hide the ovaries, this being the source of many an erroneous statement on herbarium labels to the effect that the plant is a staminate one when a dissection reveals only or mainly perfect flowers. This error has not infrequently crept into the literature, even in descriptions of new species. Anthers may also be purplish, e. g. *T. polycarpum* S. Watson, or whitish, e. g. *T. clavatum* DC., or even greenish, e. g. *T. hypoglaucum* Rydb. The length of the anther given in the following descriptions is always the length of the anther exclusive of the acumen and immediately after dehiscence, for mature anthers are slightly longer before dehiscence than after, and as they wither and twist, they become still shorter.

Ovary. At flowering time the ovary is generally too small to be characteristic but the stigma varies within definite limits for each species. As the ovary matures into the fruit the stigma usually undergoes a slight elongation, but very often drops off altogether. In quite a number of species there is no sharp demarcation between the style and the stigma. In such cases the length given for the stigma also includes the base of the style.

Fruit. Nearly all species are based mainly on characters drawn from the fruits, for in most species mature fruits vary but little, while, on the other hand, they vary from once species to another. Characteristic features are: shape; length and breadth; thickness; length of stipe; number and design of nerves and ridges; number, direction and pubescence of the fruits; thickness of the fruit-wall.

Nerves of the fruit when raised on ridges often may not be

set off from the ridge itself, but they are usually conspicuous. Nerves are typically eight in number, one dorsal, one ventral, and three on each side. They usually branch off at the base and join at the summit of the fruit; they are then described as being simple. They may run straight from the base or arch over the central cavity or they may be simply curved, as in the case of the lateral nerves of a strongly flattened fruit. Nerves may also be sinuous, undulating, branching or anastomosed.

Relation between Staminate and Pistillate, Flowering and Fruiting Material

This is a problem which is not yet thoroughly worked out and is far from being so. In many species this relation has been established on uncertain grounds, mainly on herbarium specimens bearing two or more fragments representing different phases of, *presumably*, the same species. Sometimes intermediate stages help indicate relation or an unusual specimen will bear both flowers and fruits. Of course, in this problem geographic distribution is not altogether a negligible character. But many species are still known only in fruit or in flower and it is not impossible that the other stage has been collected and is passing under another name.

Interpretation of Descriptions

Most describers, when proposing new species of *Thalictrum*, have emphasized the division of the leaf, the contour, size and figure of the leaflets, the length of petioles and petiolules, all characters of little, if any, diagnostic value; while the type of pubescence, the length of style, filament and anther, the type of nervation and size of the fruit, were too often omitted. This unfortunate neglect renders many a description unintelligible unless one has access to the type-specimen. Consequently an effort was made to study all types that were available in America, for European herbaria are inaccessible for the time being. In so doing I was fortunate enough to have access to nearly all types of *Thalictrum* preserved in America. The United States National Herbarium had stored away a large number of its types but, except in two cases, isotypes were available. Photographs of some 10 types or syntypes along with numerous fragments

and isotypes of species described in Europe have enabled me to understand a fairly large majority of these, while Lecoyer's opinions and discussions greatly helped in interpreting the others. Unfortunately, a few names are still of dubious application and might, when the types are studied, antedate some of the names here accepted.

Terminology of Types

There is much variation as to the use and meaning of the terms applied to typical material. There follow the definitions of those terms needed and used in this paper to characterize such material.[1]

Type: an herbarium specimen upon which the description of a new plant is based. If more than one specimen was used, the type is the specimen designated as such by the describer or by a later student of the group.

Syntype: an herbarium specimen upon which the description of a new plant is based, when there are more than one, and no type has been selected.

Paratype: any specimen, other than the type and the isotypes, upon which the description of a new plant is based. Duplicates of paratypes may be termed paraisotypes, but we have preferred to extend the meaning of paratype to include such specimens in all cases when the homogeneity of the collection was not under suspicion.

Isotype: a duplicate of a type, usually bearing the same collection-number.

The best discussions of type-nomenclature I have found in the literature are: D. L. Frizzell, *Terminology of Types*, Am. Mid. Nat. **14:** 637–668. 1933, and C. X. Furtado, *The Nomenclature of Types*, Gardens' Bull. Straits-Sett., **9:** 285, 308, both with bibliography. Frizzell's paper is written by a zoologist from a zoologist's point of view; it is in the form of a lexicon, with 233 terms, 10 of which he more strongly recommends. The second paper, the author of which is a botanist, proposes and defines 22 terms and 21 compounds with the possibility of a great many more.

[1] Since this study was completed before the clarification of the subject by Blake in Rhodora, 45: 481, 1943, no changes have been made in the text.—Eds.

Such terms as LECTOTYPE, LOGOAPOTYPE, NEOTYPE, PROTOMEROTYPE, and many others have been proposed to express an historical relation between the selection of the type and the date of publication of the new taxonomic group. When it comes to the studying of a species, it is irrelevant whether you work with a HOLOTYPE or a LECTOTYPE. No term expressing an historical relationship has been found necessary in this paper for the proper understanding and concise treatment of a taxonomic problem. Furtado also distinguishes between ISOTYPES and HAPTOTYPES, according to whether they were, or were not, collected from the same plant and at the same time as the type-specimen. Truly this is a very pertinent distinction and in many cases these terms, no doubt, may be useful. But, unfortunately, the average herbarium duplicate bears little or no evidence which might help in making this very important distinction. I have thus felt compelled to use ISOTYPE in a more general sense.

Both Frizzell and Furtado recommend the use of HOLOTYPE for TYPE. This proposal is in accordance with the general use amongst the zoologists and would promote uniformity. But we have not departed in that respect from what seems to be at present the general use amongst botanists. To other terms such as CLASTOTYPE, FOTOTYPE, and others, we have preferred the corresponding English expressions: FRAGMENT OF A TYPE, PHOTOGRAPH OF A TYPE, etc., for reasons of clarity and simplicity.

KEYS

Characters in the artificial keys have been selected according to their usefulness, while those used in the general keys to sections and species are either artificial or such as to place related species together. The numbering of species, however, is intended to follow natural relationships whenever possible.

ACKNOWLEDGMENTS

I wish to thank many of the people at Harvard University who have been of great help, and especially so Dr. M. L. FERNALD under whose direction this work was carried out and who also supplied photographs of type-specimens of three of the species described in Europe, and Mr. C. A. WEATHERBY and Dr. R. H. WETMORE for their numerous and helpful suggestions. This

research would not have been possible without the help of the late Brother Marie-Victorin and a fellowship from the Government of the Province of Quebec. The following institutions have offered facilities for studying the herbarium material preserved in their collections: Academy of Natural Sciences of Philadelphia (ANS); Brooklyn Botanical Garden (BG); National Herbarium of Canada (C); California Academy of Sciences (CA); Field Museum of Natural History (F) which also supplied eight photographs of types in European herbaria; Gray Herbarium (G); Missouri Botanical Garden (M); University of North Carolina (NC); New England Botanical Club (NE); Notre-Dame University (N-ND for the Nieuwland Herbarium and G-ND for the Greene Herbarium); New York Botanical Garden (NY); University of California (UC), including the Clokey Herbarium on deposit at the University of California (C-UC); the United States National Herbarium (US). The letters between parentheses are the abbreviations used throughout this paper to designate each of these institutions.

THALICTRUM

Thalictrum L., Gen. Pl., ed. 5, p. 242, 1754. *Physocarpum* Bercht. & Presl, O Priroz. Rostl. **1:** 14, 1823. nec *Physocarpon* Necker, Elem. **2:** 164, 1790, nec *Physocarpus* Maxim. Acta Horti Petrop. **6:** 219, 1879, nec *Physocarpos* Cambess. Ann. Sc. Nat. **1:** 239 et 385, 1824, nec *Physocarpa* Raf. New Fl. Amer. **3:** 73, 1836. *Ruprechtia* Opiz, Sez. Rost. Kve. 86, 1852, nec *Ruprechtia* C. A. Meyer, Mém. Acad. St-Péters. 6 sér. **4:** 148, 1840, nec *Ruprechtia* Reichb. Nom. 166, 1841. *Leucocoma* (Greene) Nieuwl. Amer. Midl. Nat. **3:** 254, 1914, nec *Leucocoma* Rydb. Fl. Rock. Mts. 108, 1917. *Sumnera* Nieuwl. Amer. Midl. Nat. **3:** 254, 1914. *Plantae* perennes, *caule* annuo herbaceo vel suffruticoso plus minusve sulcato, *caudice* perenni, vel interdum stoloniferae. *Radices* numerosae fibrosae, interdum tuberosae. *Folia* alterna, vel raro subopposita, vel opposita etiam, plerumque ternata et amplius composita. Floralia saepius desunt. *Inflorescentia* paniculata saepius racemosa vel subcorymbosa, nuda vel parum foliosa, *ramis pedicellisque* alternis vel subaggregatis. *Petioli* basi dilatati, saepius vel amplexicaules vel subamplexicaules, plus minusve dilatati duarum modo stipularum vel nonnunquam etiam stipulati et interdum stipellulati quoque. *Flores* numerosi, perfecti vel dioici vel polygami. *Calyx sepalis* hinc quatuor illinc quinque nonnunquam sex vel septem, fugax, viridis vel frequentius petaloideus.

Corolla deest. *Stamina* libera plura vel numerosa, sepala fere semper per anthesim excedentia, numero variabili. *Antherae* adnatae comissura filamentis basilari nec articulatae. *Ovaria* unilocularia soluta, numero in diversis diverso et variabili, *semine* solitari apicali inverso. *Stylus* elongatus, *stigma* vel similiter elongatum vel triangulare vel punctatum ferens per longitudinem fere totam. *Carpella* pauca vel numerosa, uniseminata indehiscentia, sicca nervosa, plus minusve inflata, nonnunquam stipitata, frequenter costata. Species typica: *Thalictrum foetidum* L. ut imprimis Britton & Brown proposuerunt in Ill. Fl. **2:** 118. 1913.

The proposed standard species of the Linnaean generic names published in the International Rules of Botanical Nomenclature, p. 142, 1935, suggested that *T. aquilegifolium* L. should be taken as a type-species; but, in view of the fact that the latter species has been many times separated from *Thalictrum* to form a separate monospecific genus, it seems preferable to adhere to the older proposal. And, after all, *T. foetidum* L. is much more characteristic of the genus as a whole than is *T. aquilegifolium* L.

Subdivisions of the Genus

Two genera, *Anemonella* and *Trautvetteria* have been separated from *Thalictrum* and are usually accepted as distinct genera. Many more generic segregations have been proposed at one time or other but are not here considered worth recognition. Those synonyms are listed under the subdivisions which were thus raised to a generic rank.

De Candolle in his Systema (vol. **1**, 1817) proposed five sections and four more subdivisions; Lecoyer (Bull. Soc. Bot. Belg. **24:** 111–113, 1885) was the first to recognize the fact that a natural classification of the genus sets the American species apart from the Eurasian ones but, unfortunately, the names he gave to his sections and subsections were not in Latin; Prantl (Nat. Pfl. **3**, 2: 66) in 1888 proposed nine new subdivisions for the genus but he grouped the species in such a way that it is impossible to ascribe to each of his new names a definite position in the scheme actually adopted in this paper; E. L. Greene (Leaflets, **2:** 49) in 1910 proposed the family *Thalictraceae* to include *Thalictrum*, *Anemone*, *Coptis*, *Aquilegia* and *Anemonella;* and in 1914 Nieuwland proposed to recognize *Sumnera* and *Leucocoma* as distinct genera.

KEY TO THE SUBDIVISIONS OF THE GENUS

a. Flores perfecti; stigma sub anthesim a sepalis persaepius quinis recedens. . . . . Subgenus THALICTRUM. . . . *b.*

b. Stigma bialatum deltoideum ventrale sessile. Filamenta filiformia et saepius ad junctionem cum antheris paullulum incrassata. Carpella matura costata sessilia. . . . *c.*

c. Carpella matura haud compressa. . . . . Sectio HOMOTHALICTRUM.

c. Carpella matura compressa. . . . . Sectio GENUINA.

b. Stigma haud alatum nec sagittatum vel, si anguste alatum, lineare. . . . *d.*

d. Filamenta filiformia et saepius ad junctionem cum antheris paullulum incrassata. Stigma nonnumquam circinatum. Carpella matura nunquam costata, nervis tamen valde rugosis, saepius breviter stipitata Sectio LEPTOSTIGMA.

d. Filamenta staminum plus minusve clavata, ad junctionem cum antheris paullulum constricta, alba vel rufescentia, raro purpurascentia; variant antherae globosae usque ad oblongo-lanceolatas; stigma nunquam alatum nec sagittatum nec circinatum. . . . *e.*

e. Fructus inflatus vel compressus, apterus. . . . *f.*

f. Fructus costatus sessilis vel subsessilis nec compressus sed nervis singulis saepius in costas elevatis. Stigma ventrale. . . . . Sectio ERYTHRANDRA.

f. Fructus stipitatus plus minusve compressus nec costatus, nervis tamen rugosis. . . . *g.*

g. Fructus plus minusve compressus nervo dorsali convexiore vel curvato ad modum ventralis; stigma ventrale vel apicale; pedicelli recti; folia caulinaria saepius desunt. . . . . Sectio PHYSOCARPUM.

g. Fructus valde compressus nervo ventrali convexiore; folia caulinaria adsunt et 3–5-ternata sunt; stigma cylindraceum. . . . . Sectio OMALOPHYSA.

e. Fructus valde tri-quadrialatus stipite longissimo; stigma ventrale. . . . . Sectio TRIPETRIUM.

a. Flores dioici vel polygami, raro perfecti, stylus sub anthesim sepala quaterna excedens. . . . . Subgenus LECOYERIUM.

h. Flores polygamo-monoici, licet perfecti, stigma filiforme elongatum, saepius cylindraceum, rarissime anguste bialatum. Sepala haud dimorpha. . . . *i.*

i. Ovaria pauca, solitaria, vel gemina, licet raro 3–4. Pedicelli longissimi tempore fructuum maturitatis. Flores perfecti. . . . . Sectio CINCINNERIA.

i. Ovaria numerosa. Pedicelli ad 6 cm. longi. Flores polygamo-monoici, raro perfecti. Stigma, nisi in *T. Johnstonii*, cylindraceum. . . . *j.*

j. Foliolae haud peltatae. . . . . Sectio CAMPTOGASTRUM. . . . *k.*

k. Ovaria 10 vel pauciora. Carpella matura compressa. . . . *l.*

l. Carpella nervo ventrali nullo modo gibboso. Subsectio SIMPLICIA.

l. Carpella nervo ventrali gibboso. . . . . Subsectio GIBBOSA.

k. Ovaria 18–36. Carpella matura ventre globoso. Stigma paullulum clavatum. . . . . Subsectio VENTURIANA.

j. Foliolae peltatae. . . . . Sectio PELTERIA. . . . *m.*

m. Foliolae minores petiolis prope marginem insertis. Subsectio SUBPELTATA.

m. Foliolae ampliores petiolis circa tertias insertis. Subsectio EUPELTATA.

h. Flores dioici vel polygamo-dioici, stigma breve plus minusve bialatum. Sepala dimorpha, floris foeminei minora....*n.*
n. Filamenta colorata filiformia, flores dioici, rarissime polygami. Foliola apice trilobata, lobis persaepius crenatis.....Sectio HETEROGAMIA....*o.*
o. Carpella recta ventre symmetrico, nervis crassiusculis, nec compressa nec curvata. Radices fibrosae vel tuberosae, nec stoloniferae. Plantae glabrae....*p.*
p. Radices tuberosae....*q.*
q. Carpella nervis simplicibus nec sinuosis sed rectis. Folia ternatisecta.....Subsectio DEBILIA.
q. Carpella nervis sinuosis.....Subsectio SINUOSA.
p. Radices fibrosae. Petioluli articulati. Nervi carpellorum haud sinuosi.....Subsectio DIOICA.
o. Carpella curvata vel compressa. Plantae nonnunquam pubescentes, plus minusve stoloniferae....*r.*
r. Carpella pariete crasso et firmo, incurvata, haud compressa, costata, nervis haud distinctis a costis, nervo dorsali convexiore quam ventrali Subsectio INCURVATA.
r. Carpella plus minusve compressa, recta, vel basi plus minusve recurvata, vel valde compressa, nervis conspicuis, pariete nonnunquam membranaceo....*s.*
s. Carpella parum compressa, recta et conspicue stipitata, nervo ventrali convexiore quam dorsali.....Subsectio CLAVOCARPA.
s. Carpella subsessilia vel, si stipitata, stipite recurvato vel nervo ventrali convexiore quam dorsali, vel valde compressa....*t.*
t. Crassitudo carpelli dimidiam latitudinis partem vel attingit vel superat.....Subsectio COMPRESSA.
t. Crassitudo carpelli a dimidiis latitudinis recedit Subsectio LAMINARIA.
n. Filamenta alba saepius plus minusve clavata, flores polygamo-dioici. Foliola integra, vel, si apice trilobata, lobis integris.....Sectio LEUCOCOMA.

The following treatment takes into account all species attributed to America, plus, when a subdivision of the group is not confined to America, a brief world-treatment of that subdivision. However, the § GENUINA is not fully treated, for only two, or perhaps three, of its numerous members have been collected in America. To add a full treatment of this section to this paper would have transformed it into a world-monograph, a study not possible under the present conditions. Similarly § OMALOPHYSA is incompletely treated for lack of sufficient herbarium material.

Subgenus THALICTRUM (DC.) Reich. Sect. *Euthalictrum* DC. Prod. **1:** 12, 1824. Sect. *Thalictrum* DC. Syst. **1:** 172, 1817. Subg. *Thalictrum* (DC.) Reich. Consp. Regn. Veg. 192, 1828. *Plantae radicibus* persaepius fibrosis, *caule* plus minusve foliosa, *foliis* stipellulatis vel estipellulatis. *Inflorescentia* ampla, saepius paniculata, raro subcorymbosa vel racemosa. *Flores* perfecti.

Sepala saepius 5 in flore. *Stigmata* in anthesi a sepalis recedentia. Species typica *Thalictrum foetidum* L. sit.

Sectio **Homothalictrum.** *Homothalictrum* Fries, Sum. Veg. Scan. 27, 1846, nomen nudum. Sect. *Camptogastrum* f. *Flexuosa* Prantl, Nat. Pfl., **3:** 2: 66, 1888.—*Filamenta* filiformia nonnunquam purpurascentia. *Stigma* bialatum deltoideum ventrale sessile. Carpella matura costata sessilia nec compressa. Species typica sectionis *T. minus* L. sit.

As created by Fries, his genus *Homothalictrum* included only *T. alpinum* L.; and I was also at first under the impression that the simple raceme was a character sufficient by itself to set off this species from the rest of the genus. But this character must be considered rather as an extreme, especially if one compares this species with its nearest relatives, *T. Esquirolii* Lévl. & Vant. and *T. isopyroides* Meyer. Amongst the species to be referred here besides *T. minus* L., there are: *T. alpinum* L., *T. angustifolium* Jacq., *T. Esquirolii* H. Lévl. & Vant., *T. flavum* L., *T. galioides* Nestl., *T. isopyroides* Meyer, *T. kemense* Fries, *T. punduanum* Wall., *T. rugosum* Ait., *T. simplex* L., *T. squarrosum* Steph.

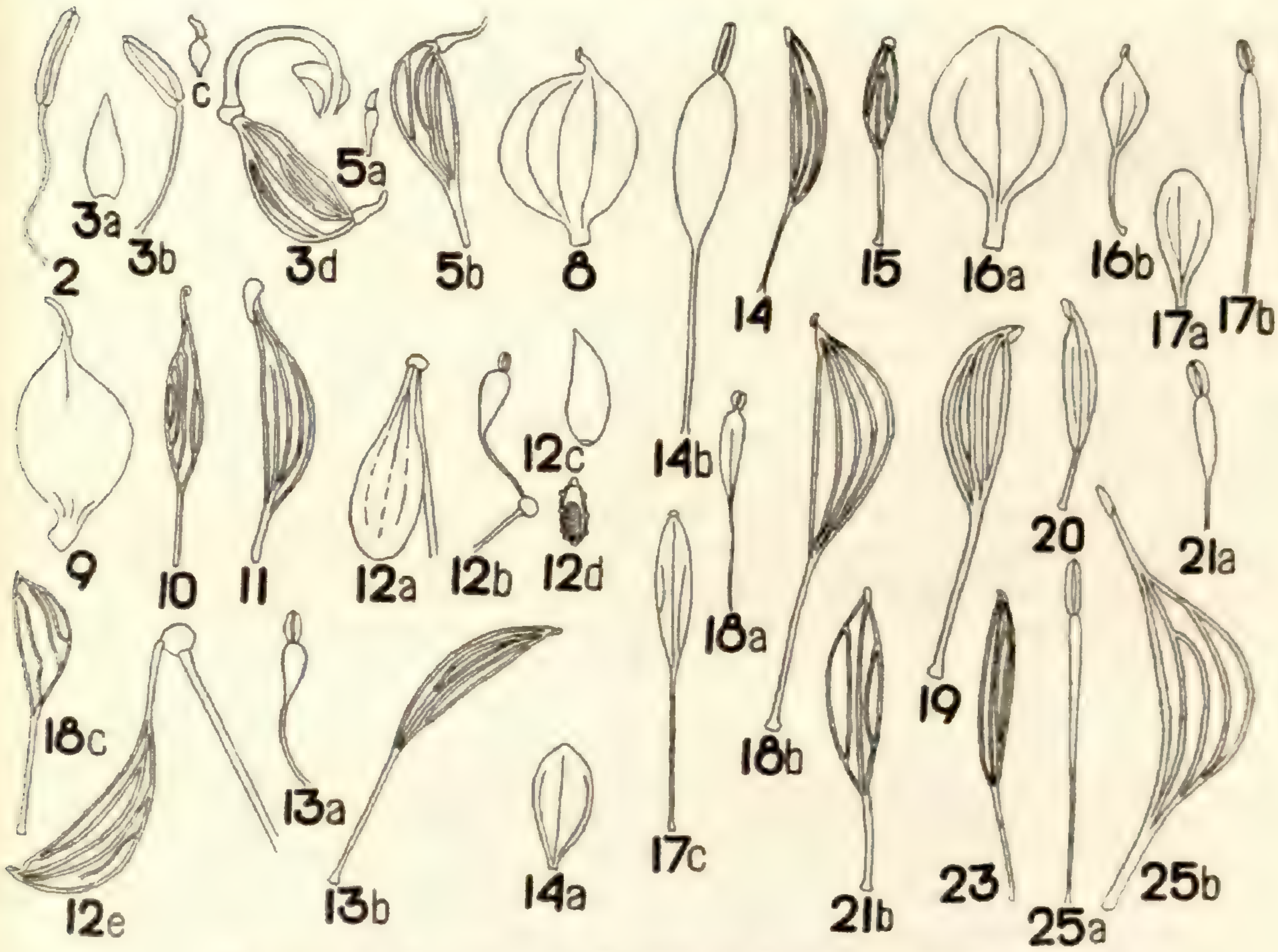
1. Thalictrum minus L.

To this species can be referred a specimen from the herbarium of John Ball and preserved in the Gray Herbarium. It was collected in Greenland by Giesecké, so says the label. C. L. Giesecké was a geologist who, between 1806 and 1813, made collections of plants on Greenland. His report was published in Brewster's Edinburgh Encyclopaedia, **10:** 100–102, 1832, and the only *Thalictrum* listed is *T. alpinum.* Thus it is not at all improbable that the label was pasted to the wrong specimen. That label, however, reads: *Thalictrum Greenland Giesecke.*

T. R. Jones, reviewing the botanical literature on Greenland in the Man. Nat. Hist. Gr., p. 256, 1875[1], casts a doubt on the accuracy of Giesecké's list. "His list", he writes, "comprehends a large number of species, but he is manifestly wrong in regard to many of them. Some, which may possibly be members of the Greenland flora, have never been found since his day."

Giesecké having spent eight years in Greenland studying the mineralogy of the country, it is not impossible that he might have chanced to botanize on peculiar spots where the local

[1] See also Trans. Bot. Soc. Edin., 9, 2: 430–465, 1868.



Details of Flowers or Fruits of Thalictrum, all × 6

(For explanation see end of paper. Note also that the "c" of "14c" has been omitted by error.)

geological formations supported an endemic flora. Greenland is reputedly well known botanically, but as recently as 1937, Polunin reported seven new species from the Julianehaab sector alone and confirmed six doubtful previous reports. Although the flora of that "subcontinent" shows more affinities with America than with Europe, the presence of *T. minus* sensu amplo can not be rejected *a priori*, for it is a species ranging over Eurasia and Africa from the Bering Straits to Ireland and from Arctic Norway to central Africa. For the time being it is, however, preferable to wait until some other field-botanist confirms Giesecké's specimen by collecting the plant anew.

Lecoyer in 1885 recorded over 200 synonyms of *T. minus* and no doubt many others have been coined since that time. In view of the types of these being all in Eurasian herbaria and also because that species is rather scantily represented in American

herbaria, it is preferable to leave to some other worker, who might have access to the types, the task of disentangling, *if possible*, the status of this species, for, as Prantl characterizes it, very accurately indeed, it is a "Formenchaos".

2. T. **Hultenii** sp. nov. *Planta* 35–70 cm.[1], omnino glabra nis in cauli. *Radix* ignota est. *Caulis* arenoso-pruinosus sub tempus florendi. *Folia* caulinaria 2–4-ternata, internodos subaequantia, superiora et intermedia in apice dilatationis petiolaris sessilia, inferiora plus minusve petiolata. *Stipulae* auriculatae, plus minusve laceratae. *Stipellulae* desunt. *Foliolae* variabiles, saepius subquadratae, apice trilobatae, ca. 1.5 cm. long. *Inflorescentia* paniculata 5–10 cm. long., parum ramosa. *Pedunculi* in axilla saepe folii ternati, saepius folii simplicis, rarissime bracteae. *Flores* omnes perfecti, pauci in planta. *Sepala* paullulum cucullata, elliptica, ca. 3.0 mm. long., supera erosa, albicantia, plus minusve luteo-tincta. *Stamina* 8–15 in flore. *Filamenta* pallida *flavescentia* ca. 3.5 mm. *Antherae* oblongae vel oblongo-lanceolatae, flavae, ca. 2.0 mm., *mucrone* brevi ca. 0.1 mm. *Ovaria* 3–6 in flore, *stigmate* 0.4–0.7 mm. *Carpella* matura ignota, fere matura sessilia ventre ovoideo vel subgloboso. Floret Julio et Augusto. ALASKA: *Hultén* 6753, Unalaska, July 20, 1932 (NY, TYPE); *Van Dyke 38*, Unalaska, Makushin Bay, moist grassy places on hillsides, July 16, 1905 (G); *J. M. Macoun 115*, Unalaska, July 25, 1891 (G, NY); *Hall*, Unalaska, Iliuliuk, Oct. 1, 1871 (G); *Harrington*, Unalaska, Iliuliuk, Oct. 12, 1871 (G); *Evermann 120*, Amakuak Island, Aug. 1, 1892 (F); *Eyerdam 2278*, Unalaska, Aug. 22, 1932 (NY); *Kincaid*, Unalaska, Sept. 18, 1897 (UC); *A. E. & R. T. Porsild 641*, Inana River, Hot Springs, 64° N., 150° 20′ W., recent clearings in the vicinity of recently abandoned settlement, July 8, 1926 (G). FIG. 2.

This species has hitherto passed as either *T. kemense* Fries or *T. majus* L. or *T. minus* var. *kemense* (Fries) Trel. It differs mainly in the size of the fruit and by its contracted leafy inflorescence. Dedicated to ERIC HULTÉN, the author of "*Outline of the History of Arctic and Boreal Biota during the Quaternary Period*", a fundamental book on the phytogeography of the Arctic-boreal floras, and of detailed works on the floras of Kamtchatka, the Aleutian Islands and Alaska. The habitat of the last cited specimen suggests that the plant might have been somewhat overlooked on continental Alaska.

3. T. ALPINUM L. *Planta* plus minusve stolonifera, erecta

[1] Where not otherwise indicated, all measurements in descriptions apply to the height of the plant, or the length of the organs concerned.

rigida, omnino glabra (0.5)–1.5–(3.0)–decimetralis. *Radices* fibrosae. *Folia* bi-quadriternata, basilaria 1–5, caulinarium deest vel raro solitarium, folia inferiora inflorescentiae interdum lanceolata integra, raro trilobata, saepius desunt, superiora semper desunt. *Foliolae* flabellatae, coriaceae, inferne plus minusve glaucae, 1 cm. longae vel breviores, apice 3–7-lobatae, *margine* plus minusve revoluto, *nervis* rugosis, inferne rugosioribus. *Inflorescentia* nuda racemosa, e *pedunculis* alternis ante anthesim adpressis, postea recurvatis. *Sepala* 1.5–2.3 mm. longa, ovata vel elliptica. *Stamina* 8–15 in floribus singulis. *Filamenta* ca. 3.5 mm. filiformia, ante anthesim aliquo modo flavescentia, postea tamen purpurascentia. *Antherae* 1.2–2.3 mm. longae, oblongae vel lineares, apice acutae, etsi mucronatae breviter etiam, primo flavescentes deinde virido-purpurascentes. *Ovaria* 3–6 in floribus singulis. *Stigma* ca. 0.75 mm. longum, in fructu valde reflexum ad tergum. *Carpella* matura 0–4 in pedicellis singulis, reflexa vel pendula, 2.8–3.5 cm. longa, subglobosa vel oblanceolata basi saepius attenuata vel stipitata, apice rotundata, nervata, *nervis* ca. 12, rostro ad tergum valde deflexo. Floret a Junio ad Septembrem.

The three following varieties seem to be worth recognition, although the characters of each are not absolutely constant.

3a. T. ALPINUM var. **typicum.** *T. alpinum* L., Sp. Pl., **1:** 545, 1753. *T. alpinum* var. *pallidum* Norman, Arch. Math. Naturvid. **8:** 4, 1883. *T. alpinum* var. *gaspense* Greene, Ott. Nat. **23:** 18, 1909. *T. alpinum* var. *microspermum* Greene, l. c. 1909. *T. alpinum* var. *nesioticum* Greene, l. c. 19, 1909. *T. alpinum* var. *pudicum* Greene, l. c. 1909. *Planta stolonibus* plus minusve elongatis horizontalibus, raro caespitosa. *Radices* paucae saepius sparsae. *Foliolae* supernae laete virides saepius valde lucidae nec glaucae. *Ovaria* saepius obovata vel subglobosa, sessilia vel subsessilia. *Carpella* matura *stipite* 0.5 mm. vel breviore vel deente.—GREENLAND: *Vahl. f.* (G); *A. E. Porsild 257*, south coast of Disko Island near Godhavn, 69° 14′, fertile slopes near the warm springs, July 27–28, 1937 (G); *Seidenfaden & Ostenfeld 296*, East Greenland, northern side of the head of Husk-ax Fiord, 73° 38′, Aug. 15, 1929 (G); *M. P. Porsild & R. T. Porsild*, Vest-Grønl., Ubekendt Eijland, Igdlorssuit, 71° 14′, 21 juli, 1929 (G); *Eugenius*, Groenl. occid., ca. Neria, 61° 33′, 26 juli, 1935 (G). LABRADOR: *Bell 874*, Cape Chudleigh (C); *Fernald & Wiegand 2430*, Blanc Sablon, limestone and calcareous sandstone terraces, Aug. 6, 1910 (G). NEWFOUNDLAND: *Robinson & Schrenk 26*, marsh near confluence of Exploits River and Badger Brook, Aug. 13, 1894 (ANS, G, isotypes of *T. alpinum* var. *microspermum*); *Fernald & Long 28,272*, Quirpon Island, wet boggy tundra in central Valley, Aug. 7, 1925 (G); *Fernald, Long & Fogg 1703*, Old Port au Choix,

turfy and peaty margins of dry gravelly limestone barrens, July 22, 1929 (G); *Fernald & Wiegand 5443*, Millerton Junction, dry bog, July 7, 1911 (G); *Fernald, Long & Dunbar 26,690*, Brig Bay, peaty and turfy knolls or slopes on limestone barrens, Aug. 6, 1924 (G). Québec: *Victorin & Rolland 25,441*, Minganie, Île Saint-Charles, près de la tourbière du lac Salé, 20 juillet, 1926 (G); *Victorin & Rolland 21,156*, Minganie, Grande Ile, talus humide sur le rivage, avec *Anemone parviflora*, 20 juillet, 1925 (G); *Pursh*, Anticosti (G); *Macoun 3*, Anticosti, valley of Jupiter River, Aug. 20, 1883 (C, type of *T. alpinum* var. *nesioticum;* G, isotype); *Victorin, Rolland & Louis-Marie 21,155*, Anticosti, rivière Vauréal, sur les talus humides le long de la rivière, 27 juillet, 1925 (G); *Fernald*, Gaspé Co., banks of the Grand River, damp ledges, June 30–July 3, 1904 (C, type of *T. alpinum* var. *gaspense*, G, isotype); *Fernald & Collins 1046*, Gaspé Co., Bonaventure Island, Bonaventure conglomerate (calcareous) sea-cliffs, Aug. 7 & 8, 1905 (G); *Pease & Smith 25,761*, Matane Co., Mt. Logan, talus of mica schist, chimney east of Razorback Ridge, alt. 850–1000 m., July 13, 1923 (G). Yukon: *A. Müller*, Lake Kluane to Don Jek River, Aug. 11–27, 1920 (ANS). Alaska: *Blaisdell*, Cape Nome, 1900 (G); *J. P. Anderson*, Juneau, rocky alpine, June 30, 1940 (G); *A. E. & R. T. Porsild 789*, Norton Sound, Pastolik, 62° 22′ N., 163° W., coast and low swampy tundra, growing on the sides of large "niggerheads", not common, July 20, 1926 (G); *J. P. Anderson 452*, Juneau, July 4, 1917 (NY). Siberia, primorsk: *Wright*, Behring Straits, Arakamtchetchene Island, 1853–1856 (G, US); *Tiling*, Ajan (G). yakutsk: *Nilson*, Balaganach, June 27, 1898 (US). transbaicalia: *N. & V. Ikonnikov-Galitzky* 288, montes Kentei orientales and fontes fluvii Kerulen, July 18, 1928 (NY). yenisseisk: *Kusnezow & Reverdatto 973*, distr. Turuchansk, 1914 stylo veterum[1] (NY). tomsk: *Krylov*, Altai, Margalinsky bjelok, prope pagum Nishnij Uimon, June 11, 1901 (NY); *Schischkin, Chilikina & Sumnevicz*, Altai, in jugum Terk-Tynsky fluminis, Kostachta, July 4, 1931 (NY). Turkestan: *Saposhnikov*, in jugo Tian-Schan, in alpinis, June 28, 1902 (NY). Russia, Archangel: *Steffen 567*, Vaygach Is., Aug. 16, 1926 (C). Volgda: *Soczava*, montes uralenses inter 62° et 64°, July 20, 1928 (C). Nova Zembla: *Weber*, 1891 (F); *Tolmatschew 416*, insula septentrionalis, in decliviis siccis ad flumen Notschujew in vic. radiostat. Matotschkin, July 23, 1922 v. (G). Spitzbergen: *Haley*, King's Bay, July 6–8, 1935 (G). Lapponia: *Anderson 84*, 1869. Sweden: *Örtendal*, Östersund, Jmelland, 1890 (G); *Asplund*, Torneträsk-området, Nuoljas nordsida, July 19, 1917 (F); *Sjorgren*, in alpe Areskutan, 1846 (G); *Alm 6523*, Torne

[1] Abbreviated elsewhere throughout this paper as *v.* or *g.*

Lappmark, Jukkasjärvi s:n, in monte Kaisepakte, alt. ca. 750 m., July 18, 1926 (G); *Tedenius*, Herjedal bor. occid., Malmagen, julio (G). NORWAY: *Taylor*, Ruostavand, Tromsö, July–Aug., 1907 (G); *Fidtz*, Opdal i Sör-Tröndelag, Kalvellafossen, Aug. 11, 1910 (G); *Bocck*, 1869 (US); *Hid*, Voss: Finnesleigen, i fjóra ved Vangevalnet, 46 m. o. h. (G). FAROË ISLANDS: *Taylor*, Viderö Island, Videreite, 1903–1906 (G); *Hartz & Ostenfeld*, insula Suderö, Kvalbófjaed, July 21, 1897 (G). SCOTLAND: *J. R. Jack*, Perthshire, Ben Lin, July, 1922 (G); *Clova*, 1832 (G). ENGLAND, DURHAM: *Edmondson 4691*, upper Teesdale, Widdybank, wet places, June 27, 1909 (G). WESTMORELAND: *Beanland*, Tarn Craggs, Helvellyn, June 29, 1909 (G). YORKSHIRE: *Lees*, alt. 1600 ft., June 1872 (F). ROSSSHIRE: *Stables*, moor behind Rosebough, growing with *Pinguicula* among cowfields, June 1, 1843 (G). WALES: *Ball*, North Wales, mountains near Llanberis, May 30 & 31, 1859 (F); *Ball*, North Wales, Carnarvonshire, rocks on Snowdon, 1850 (G). ICELAND: *Seidenfaden 969*, eastern Iceland, Seydisfjord, 65° 17′, grass heath, June 27, 1929 (NY); *Sørensen*, Skagafjord, July 1, 1930 (G); *Paulsen*, SW-Iceland, Haonefjord, Hvanu, July 4, 1904 (G); *Scamman 1371*, Lakjamot, a farm in the north on the road between Stadur and Blönduos, Sept. 1–4, 1938 (G); *Scamman 1370*, Reykjavik, Aug. 2–19, 1938 (G); *Taylor*, N. Iceland, Sula mountains nw. of Akuseyvi, June 27, 1895 (G). Type, not seen, from Scandinavia, presumably preserved at the Linnaean Society of London. FIGS. 3a, b and c.

Var. *pallidum* Norman, is the early stage of the plant when the leaflets are strongly glaucous beneath. Type not seen.

Greene's four varieties are rather descriptions of individuals than of taxonomic units. Types in the National Herbarium of Canada seen, except of var. *pudicum* for which Greene did not authenticate nor indicate any typical collection nor any definite distribution. The characters stressed by Greene to separate his varieties are mainly the following: height of the plant; average number of leaflets per leaf; curvature of the pedicels; number of carpels per flower; insertion of the carpel. All these characters exhibit such a degree of variation that the isotype of var. *microspermum* at the Gray Herbarium does not correspond to the description of the type as to the height of the plant (10 to 14 inches), the number of leaflets per leaf (13 to 23), as to form of leaflets (often broader than long and as often 4–5-lobed as 3-lobed), the description of veinlets (either prominent or not), curvature of pedicels (straight to strongly recurved), number of

carpels (one or two per flower, the specimens being overmature and most of the fruits gone), and insertion of the carpels (definitely short-stipitate). And so on.

The following year[1], Greene proposed seven new species, all based on material from the western United States. Plus the characters already discussed, he emphasized the following: leaflets shining or dull, pale or dark green; sex of the plant; size and form of the stamen; length of petiole; size and form of the leaflets. Of these seven species we can say the same as has already been said about the varieties. Two characters, however, prove to be rather constant and characteristic of the western American specimens. In most cases the leaves are of a pale green and always dull on the upper surface, the latter character being the most constant of the two. On the other hand, all the material from Gaspé Peninsula to Greenland and from Alaska has leaflets of a rather dark green color and definitely shining on the upper surface. A few, very few, intermediates were encountered. Such an intermediate was *Hall & Harbour 10*, from Colorado, which happens to be the type-collection of *Thalictrum scopulorum* Greene. Some specimens from the Pyrénées are equally more or less shining on the upper surface of the leaflets.

4. T. ALPINUM var. **hebetum,** var. nov.—*T. cheilanthoides* Greene, Leaflets, **2:** 89, 1910. *T. duriusculum* GREENE, l. c. 92, 1910. *T. elegantulum* GREENE, l. c. 93, 1910. *T. leiophyllum* GREENE, l. c. 90, 1910. *T. monoense* GREENE, l. c. 93, 1910. *T. scopulorum* GREENE, l. c. 91, 1910. *T. suspensum* GREENE, l. c. 92, 1910.—*Planta* parum stolonifera, raro caespitosa, *stolonibus* elongatis vel ascendentibus. *Radices* paucae aggregatae. *Foliolae* superne hebetae vel raro parum lucidae, saepius plus minusve glaucae, interdum viridulae. *Ovaria* obovata vel oblanceolata, sessilia vel subsessilia. *Carpella* matura *stipite* 0.5 mm., vel breviore vel deente.—WYOMING: *E. Nelson 648*, Chimney Park, Aug. 1, 1901 (G, isotype of *T. leiophyllum*); *Rollins 2293*, Uinta Co., near Lonetree, clay hummocks, alt. 7500 ft., June 7, 1938 (G, TYPE of *T. alpinum* var. *hebetum*); *E. B. & L. B. Payson 4413*, Sublette Co., near the lower end of New York Lakes, alt. 7700 ft., July 21, 1925 (G); *A. Nelson 9064*, Albany Co., Fox Park, on hummocks in bogs, Aug. 8, 1907 (G). COLORADO: *Hall & Harbour 10*, Rocky Mt. alpine flora, lat. 39°–41°, 1882 (US, type of *T. scopulorum;* ANS, G, US, isotypes); *Porter*, Upper Arkansas, Cash Creek, July 25, 1872 (ANS); *F. E.*

[1] Leaflets, 2: 89–93, 1910.

& *E. S. Clements 319*, Seven Lakes, alt. 3500 m., 4 julii, 1901 (G); *Hermann 5544*, Garfield Co., 1¾ miles sw. of Trappers' Lake, trail to Flat Top, low moist meadow at edge of spruce woods, alt. 9500–10500 ft., July 31, 1933 (G); *Clokey 3533*, Chaffee Co., Grizzly Peak, moist meadow, alt. 10,500 ft., May 7, 1919 (G); *Wolf & Rothrock 94*, 1873 (G); *Parry 75*, from the headwaters of Clear Creek and the alpine ridges lying east of Middle Park, 1851 (G); *Crandalle & Cowen 30*, vicinity of Como, moist soil along stream, alt. 9775 ft., Aug. 3, 1895 (G); *Osterhout*, Laramie Co., North Park, July 25, 1898 (G); *Baker, Earle & Tracy 637* [and not *437*], above Durango, Hamor's Lake, July 24, 1898 (G-ND, type of *T. suspensum;* G, photograph of the type; NY, US, isotypes; *Brandegee 890*, Sierra Sangre de Cristo, Aug., 1879 (UC)). Utah: *Porter*, Uinta Mountains, July 25, 1873 (ANS, G); *M. E. Jones 5826a*, U. M., creek near Fish Lake, alt. 9000 ft., Aug. 11, 1894 (US, type of *T. duriusculum*); *M. E. Jones 5733*, Fish Lake, alt. 9000 ft., Aug. 4, 1894 (US, paratype of *T. duriusculum*); *E. B. & L. B. Payson 4877*, Summit Co., foothills of Uintahs, Mill Creek, bushy hammocks in swamps, alt. 8300 ft., July 4, 1926 (G). Nevada: *Munz 16318*, Elko Co., Ruby Mts., Lamoille Canyon, wet meadow, alt. 8500 ft., Aug. 1, 1940 (CA); *Watson 5*, northern Nevada, Clover Mountains, 40°, 1868 (US, type of *T. elegantulum;* G, isotype). New Mexico: *Standley 4324*, Pecos Baldy, alt. ca. 12,000 ft., July 11, 1908 (US, type of *T. cheilanthoides;* M, NY, isotypes). California: *Coville & Funston 1806*, White Mts., Cottonwood Creek, July 12, 1891 (US, type of *T. monoense;* ANS, G, isotypes); *Duran 1625*, Cottonwood Creek, open damp meadows, alt. 10,500 ft., June 27, 1926 (UC); *Duran 528*, White Mts., McAfee Mdw., alt. 11,700 ft., July 27, 1930 (Ca, G, UC); *Peirson 12,892* Inyo Co., Rock Creek Lake Basin, in meadow and lake margin at small lake at south base of the Transverse Ridge, alt. 10,800 ft., Aug. 5, 1939 (CA, UC). Austria: *Martius*, Tyrol, in alpis (G); *Jäggi 2561-I*, Tirolia occidentalis, in pratis humidis vallis Tuoi inter pagos Unter-Engadin et Patznaum, solo granitico, ca. 2300 m. (G); *Jäggi 2561-II*, Tirolia occidentalis, in pratis jugi inter montes Champatsch et Astas, ca. 2220 m. (G); *Krugier*, in Seiseralpe Tyrolis australis, solo dolomitico, alt. 2250 m., 16 julii, 1878 (F). Switzerland: Grisons, Buffalora (G); *Braun-Blanquet 334*, Zentralalpen, Südwesthang des Piz Daint, Münstertal 2500 m. vom Schmelzwasser durchfeuchter Weiderasen, zehr zahlreich eingestreut neben *Viola calcarata, Gentiana verna*, etc. Aug., 1920 (G). Italy: *Longa 1475*, Longobardia super., prov. di Sondrio, Bormio, in pratis uliginosis et secundum rivulos vallis di Fraele, solo vario, alt. 1800–2300 m., 27 junii, 1905 (G); *Baenitz*, Cantoniera Santa Maria, Giogo di Stelvio, alt. 2535 m., June 27, 1878 (F). France, Alps: *Girod*, hautes Alpes, gap à St. Mens, alt. 1600 m., juillet, 1905 (G); *Magnier 2623*,

basses Alpes, Larche, Arvet Touvet, Guiguet, sources du Var à Esteine, dans les prairies tourbeuses, 16 juin, 1875 (G); Alpes maritimes, Lac de Vens, 29 juin, 1898 (F); *Lebrun*, Alpes maritimes, St. Etienne, Lac de Rabuons, gazons humides, alt. 2410 m., 7 sept., 1919 (F). Pyrénées: *Rugel*, Pyrénées-Orientales, val d'Eynes (G, NY); *Suizet*, val d'Eynes, 11 juillet, 1890 (F); *Irat 51a*, Pyrénées Orientales, vallée de Carol, in pascuis editioribus prope Porta, 1 juillet, 1846 (NY); *Bordère*, Hautes-Pyrénées, pic du Campvieil, 1891 (F); *Bordère*, Hautes-Pyrénées, Trémouse, août 1864 (F); *Irat*, Hautes-Pyrénées, Vignemale, ad nives, 3 sept., 1846 (F); Pyrénées, Port de Pinède (F). Spain: *Bourgeau*, Castanesa, Bassibes, août, 1847 (G).

5. T. alpinum var. stipitatum Yabe, Bot. Mag. Tokyo, **17:** 20, 1903. *T. marginatum* Royle, Ill. Bot. Himal. **1:** 51, 1839. *T. microphyllum* Royle, l. c. 1839, nec *T. microphyllum* Anders. Bull. Soc. Bot. Belg. **24:** 292, 1885, *nomen nudum*, ex synonymis *Thalictri minoris* L. var. *elati* Lec. *T. bracteifilum* Bertol. Mem. Ac. Sc. Bolog. II, **3:** 422, 1843. ? *T. acaule* Cambess. ex Hacquemont, Voy. Ind. **4,** Botanique, 3, 1844. ? *T. alpinum* var. *elatum* Ulbrich, Not. Bot. Gart. Mus. Ber. **10:** 877, 1929. *T. alpinum* var. *microphyllum* Handel-Mazzetti, Symb. Sin. **7,** 2: 311, 1931. *T. nippono-alpinum* Honda, Bot. Mag. Tokyo, **53:** 334, 1939.—*Planta* stolonifera et caespitosa, *stolonibus* paucis elongatis horizontalibus, pluribus ascendentibus. *Radices* numerosae fasciculatae. *Foliolae* supernae saepius viridulae, nonnunquam paululum glaucae, interdum parum lucidae. *Ovaria* stipitata oblanceolata. *Carpella* matura *stipite* 0.5–2.5 mm. longo.—Nippon, hondo: *Takemoto 591*, Sinano, Aug. 9, 1923 (G). China, szechwan: *Rock 17,865*, northeast of Kula, Mount Siga, on alpine meadow, alt. 4600 m., June, 1929 (F, NY, US); *Rock 16,253*, west of Muli Gomba, Mount Mitzuga, high alpine screes, alt. 4780 m., June, 1928 (US); *Rock 5554*, Muli Kingdom, alt. 16,000 ft., June, 1922 (US); *Rock 16,405b*, Kondaling, Risonquemba, Mount Konka, on alpine meadow, alt. 4770 m., June–Aug., 1928 (US). yunnan: *Handel-Mazzetti 4696*, ad austro-orient. pagi Dschungdien (Chungtien) in lateris occid. montis Piepun, regione alpina, in glarea mobili, substr. calceo, alt. 4300–4650 m., 11 aug., 1914 (US); *Rock 4951*, Yangtze watershed, distr. of Likiang, eastern slopes of Likiang Snow Range, on limestone gravel, alt. 16,500 ft., July 8, 1922 (US); *Rock 9444*, Yangtze watershed, eastern slope of Likiang Snow Range, alt. 14,000 ft., July, 1923 (US). India, sikkim: *J. D. Hooker*, regio alp. alt. 15,000 ped. (G). kumaon: *Strachey & Winterbottom 1*, Barjikang pass, alt. 15,000 ft., (G). garhwal: *Strachey & Winterbottom 2*, Bompras, alt. 14,500 ft. (G); *Duthie 3795*, above Bhowani, alt. 12,000–13,000 ft., Sept. 16, 1885 (US). punjab: *Koelz 792*, Lahul, Khaksar, alpine meadow, alt. 15,000 ft., July 29, 1930

(NY); *Koelz 116*, Kulu, Chanduakani, alt. 12,000 ft., 1930 (NY); *Koelz 8610*, Chamba, Kukti Pass, alt. 14,000 ft., July 3, 1936 (NY); *Koelz 5039*, Kangra, Rotang La, alt. 12,000 ft., June 30–July 1, 1933 (NY, US); *Koelz 6851*, Kangra, Lahul, Drokpo Gongma, alt. 15,000 ft., Aug. 29–30 (US). KASHMIR: *Thomson*, Kishtwar, regio alpina, alt. 11,000 ped. (G); *Thomson*, Ladakh, regio alp. alt. 15–16,000 ped. (G, NY); *Falconer 22* (G); *R. R. Stewart 9776a*, Sonamarg, alt. 12,000 ft., July 23, 1928 (NY), *R. R. Stewart 19,873*, Gilgit Rd., Burzil Pass, alt. ca. 14,000 ft., July 27, 1940 (NY); *R. R. Stewart 19,997*, Deosai, near Mir Panzil Pass, alt. ca. 14,000 ft., July 28, 1940 (NY); *R. R. Stewart 18,275*, to Gadsai from Gangabal, alt. ca. 12,000 ft., Aug. 11, 1939 (NY); *T. T. Stewart 7814*, Tulion, above Pahlgam, alt. ca. 13,000 ft., July 13, 14, 1925 (NY); *Koelz*, Rupshu, Tso Kar, among dry rocks along stream, alt. 15,000 ft., June 30, 1931 (NY, US). FIGS. 5a and b.

No type material has been available of any of the taxonomic units concerned. Var. *elatum* Ulbrich was described from specimens having the flowers of *T. alpinum* L. but the vegetative characters of *T. Esquirolii* Lévl. & Vant. The flowers of those two species are not very different. One flowering specimen from the Burma-Thibet frontier, *Ward 9804*, can be referred here only doubtfully until the fruits are known.

6. T. RUGOSUM Aiton, Hort. Kew. **2:** 263, 1789. *T. flavum* L. β *speciosum* Reichard, Syst. Pl. **2:** 648, 1779. *T. speciosum* (Reichard) Poir. Encyc. Bot. **5:** 315, 1804, nec *T. speciosum* Miller, Gard. Dict. ed. 8, no. 2, 1768. *T. glaucum* Desf. Tabl. de l'École de Bot. **2:** 146, 1815, *nomen nudum*. *T. crenatum* Desf., l. c. 196, 1815, *nomen nudum*. *T. densiflorum* HBK. ex DC. Syst. **1:** 184. 1817. *T. glaucum* Desf. ex DC. l. c. 1817. *T. rugosum* Ait. β *umbelliferum* DC. l. c. 185, 1817. *T. discolor* Willd. ex Lec. Bull. Soc. Bot. Belg. **24:** 267, 1885, *nomen nudum*. *T. purpurascens* L. var. *rugosum* (Ait.) Farwell, Pap. Mich. Ac. Sci. **26:** 11, 1941.

T. rugosum Ait. was described from material cultivated in the Botanical Garden at Kew and was said to have been introduced from America. But Lecoyer, who has seen the type specimens, states that it is *T. glaucum* Desf. Apparently the Kew Gardens distributed seeds from the type-colony of *T. rugosum* Ait., for John Bartram cultivated it and so did Purdue University as late as 1924 and the Missouri Botanical Garden in 1902. Schweinitz got the plant from Bartram for his own harbarium and Muhlenberg also had it as one of his four American species. There

seems to be no doubt that the plant was never native in America and that Aiton's surmise was erroneous. A. P. De Candolle also saw the plant cultivated in a European garden under the name *T. rugosum* Ait. Apparently this plant was cultivated in America during the eighteenth century, at least in the United States, Mexico and Peru. A photograph of the type of *T. densiflorum* HBK. was lent to me by the Field Museum. It shows a plant in all points similar to *T. rugosum*. The name *T. rugosum* Ait. antedates both *T. glaucum* Desf. and *T. speciosum* Poir. and must supersede them as the oldest name of the plant of southern Europe and northern Africa.

Sectio **Genuina** (DC.), stat. nov.—Sect. *Thalictrum*, subsect. *Genuina* DC., Syst. **1:** 169 & 175, 1817. Species typica *T. foetidum* L., typus generis, sit (p. 347).

Sectio **Leptostigma,** sect. nov. Stigmatibus angustissimis nec alatis. Species typica *T. saniculaeforme* DC. sit.

Among other species belonging to this group are: *T. Dalzelli* Hook., *T. Falconeri* Lec., *T. rotundifolium* DC., *T. rufum* Lec., *T. Rochebrunianum* Franch., *T. tuberosum* L., *T. virgatum* Hook. f. & Thom. None of them grow wild in America.

Sectio **Erythrandra,** sect. nov. *Filamenta* antherarum apice clavata, alba vel rufescentia. *Carpella* sessilia vel breviter stipitata, costata, inflata. *Stigma* nunquam alatum nec sagittatum. Species typica *T. petaloideum* L. sit.

A section including *T. calabricum* Spreng., *T. Fortunei* Moore, *T. javanicum* Blume, *T. podolicum* Lec., *T. sachalinense* Lec., *T. thibeticum* Franch. and others. This section is not represented in America.

7. T. LEUCOSTEMON Koch & Bouch., Append. Ind. Sem. Hort. Berol. 13, 1854.

This species, erroneously attributed to America, probably belongs here. According to Lecoyer there does not seem to exist any type for this species.

Sectio PHYSOCARPUM DC.—Syst. **1:** 171, 1817. *Physocarpum* Bercht. and Presl, O Priroz. Rostl. **1:** 14, 1823, ut genus. Subg. *Physocarpidium* Reichenb. Cons. Regn. Veg. 192, 1828. *Compressicarpum* Lecoyer, Bull. Soc. Bot. Belg. **16:** 223, 1878, divisio ordinis indeterminati nomenque alternativum pro *Physocarpo*. *Sumnera* Nieuwl. Amer. Mid. Nat. **3:** 254, 1914, ut genus. *Clavata* Small, Man. South. Fl. 524, 1933, divisio

ordo cujus indeterminatus.—*Plantae* saepius glabrae, *foliis* estipellulatis, caulinariis paucis nisi desunt, *radicibus* nonnunquam tuberosis. *Pubescentia*, si adest, e pilis uniseriatis translucidis. *Inflorescentia* corymbosa, nonnunquam pauciflora, raro elongata. *Flores* perfecti. *Sepala* spathulata vel obovata, interdum unguiculata. *Filamenta* alba, clavata ad apicem. *Antherae* albae vel pallido-luteae. *Carpella* matura pauca stipitata nervosa, plus minusve compressa, nec costata, *nervis* tamen saepius rugosis et fere simplicibus. *Stigmata* brevissima vel globosa, subsessilia vel sessilia, florendi tempore a sepalis recedentia, marcescentia. Species typica *T. clavatum* DC. sit.

This subdivision of the genus was first created by De Candolle as a section and all five synonyms given were based on sect. *Physocarpum* DC. It included at first four species, three of which are now in other sections. Many subsequent authors have recognized this unit, always retaining *T. clavatum* and dropping the other three species. This procedure is followed here, for the characters given by De Candolle clearly show that he regarded that species as typical of his newly proposed section.

As most of the types of species belonging to this section are not accessible, it has not been possible to give a complete synonymy except for the American species. Furthermore, the material at hand is not quite abundant enough for a thorough treatment of this section. Since Lecoyer in his monograph treated only three species of this group, it is thought desirable to give a key to the sixteen species I recognize, cite at least some collections of each species and give a full treatment of the American species only, leaving out of the picture all species for which there is no herbarium material available to me.

a. Folia caulinaria triternata 2–6, stipulis laceratis. Carpella matura lignosa, ventre globoso, nervis obscuris. . . . *b.*
  b. Stigma ovatum vel ellipticum, semimillimetrale vel brevius 8. *T. baicalense.*
  b. Stigma recurvatum, circinatum etiam, millimetrale lineare. 9. *T. baicalense,* var. *megalostigma.*
a. Folia caulinaria 0–2, stipulis integris. Carpella matura pariete membranaceo, nervis saepius rugosis. . . . *c.*
  c. Stigma lineare millimetrale. Planta 15–40 cm. . . 10. *T. philippinense.*
  c. Stigma ovatum vel discoideum vel globosum semimillimetrale vel brevius. . . . *d.*
d. Foliolae peltatae. . . . *e.*
  e. Foliolae saepius ovatae, basi integrae, apice acutae 23. *T. ichangense.*
  e. Foliolae coriaceae orbiculares, per marginem totam grandidentatae. . . . . 24. *T. coreanum.*
d. Foliolae haud peltatae. . . . *f.*

f. Foliolae oblongo-lineares integrae, nisi interdum lobis 2–3.....22. *T. integrilobum.*
f. Foliolae dentatae....*g.*
g. Folia caulinaria duo opposita orbicularia simplicia. Radix stolonibus longis.....11. *T. filamentosum.*
g. Folia caulinaria vel desunt, vel alternantia, vel 1–2 ternata sunt....*h.*
h. Foliolae infernae pubescentes....*i.*
i. Carpella ventre lanceolato....*j.*
j. Carpella falcata. Foliolae cordatae asymetricae.....13. *T. declinatum.*
j. Carpella parum asymetrica. Foliolae basi rotundae.....14. *T. acutifolium.*
i. Carpella ventre obovoideo vel rhomboideo 16. *T. unguiculatum.*
h. Plantae omnino glabrae....*k.*
k. Carpella matura ventre falcato oblanceolato 4–5 mm. longo, nervo ventrali concavo..12. *T. clavatum.*
k. Carpella matura nervo ventrali convexo vel fere recto....*l.*
l. Carpella matura ventre lanceolato....*m.*
m. Planta ca. 5 dm. alta; inflorescentia subcorymbosa vel elongata, foliolis fere ovatis 2–8 cm. longis....*n.*
n. Carpella matura ventre 3.0–3.2 mm. longo; stamina 7–9 mm.; antherae millimetrales.....14. *T. acutifolium.*
n. Carpella matura ventre 4.0–5.3 mm. longo; stamina ca. 3 mm.; antherae 0.5–0.8 mm.....21. *T. Chiaonis.*
m. Planta 1–2 dm. alta; flores 3–9; foliolae 0.5–2.0 cm.; stamina 4–5 mm.....*o.*
o. Foliolae fere orbiculares. Stamina ca. 5 mm. Stigma discoideum sessile. Carpella matura stipite ca. 3.5 mm. 17. *T. Gueguenii.*
o. Foliolae rhomboideae. Stamina ca. 4 mm. Stigma elongatum insertum ad styli ventrum. Carpella matura stipite 1.2–1.5 mm.....20. *T. Watanabei.*
l. Carpella matura ventre obovato vel ovato vel elliptico vel semiobovato....*p.*
p. Carpella ventre et stigmate fere symetricis. Stigma sessile depresso-globosum.15. *T. microgynum.*
p. Carpella nervo dorsali multo convexiore quam ventrali. Stigma discoideum, insertum ad ventrum vel styli brevis, vel ventri apicalis....*q.*
q. Stamina 2–4 mm.; carpella matura 1.0–1.2 mm. lata.....18. *T. mirabile.*
q. Planta semimetralis; stamina 5–6 mm.; carpella matura ventre 3–4 mm. longo, 1.4–1.8 mm. lato.....19. *T. tuberiferum.*

8. T. BAICALENSE Turcz. ex Ledeb. Fl. Ross. **1:** 7, 1841. *T. baicalense* Turcz. Bull. Soc. Imp. Nat. Mosc. **2:** 85, 1838, nomen nudum.—SIBERIA, AMUR: *Korshinsky*, Amur medius, 1891 v. (US); *Korshinsky*, Permikina, 18 Avr., 1891 g. (G); *Korshinsky*,

Khabarovka (na Amurye), 22 Maya, 1891 g. (G); *Maak*, ad fluvium Amur (G). NIPPON, HONDO: *Masamune*, Nikko, July 3, 1926 (NY). MANDSHURIA: *Schrenk 173*, ad fluv. Amur, 1855 (G). CHINA, KANSU: *Ching 1003*, vicinity of Choni, alt. 3100–3300 m., Sept. 7–15, 1923 (US); *Ching 360*, Hsia Mo K'ou, near Lichen, alt. 2000 to 2300 m., July 7–8, 1923 (US); *Rock 12,862*, T'ao River basin, banks of T'ao river, opposite Choni, flowers greenish, alt. 8200 ft., July, 1925 (G). FIG. 8.

9. T. BAICALENSE Turcz. var. **megalostigma,** var. nov.—*Stigma* lineare recurvatum, circinatum etiam, millimetrale.—CHINA, SZECHWAN: *Fang 3619*, Kangtin Hsien, Tachienlu, in thickets, herb 3 ft., alt. 9000–9500 ft., Sept. 27, 1928 (G, TYPE; US, ISOTYPE); *Wang 21,377*, ascending to Fu-pien Hsien, roadside, thicket-floor, alt. 3400 m., June 19, 1930 (G), herb 3 ft. FIG. 9.

10. T. PHILIPPINENSE C. B. Robinson, Bull. Torr. Bot. Club, **35:** 65, 1908.—PHILIPPINES, LUZON: *R. S. Williams 957*, prov. Benguet, Baguio, June 22, 1904 (NY, paratypes); idem *1137*, June 22, 1904 (NY, TYPE; G, ISOTYPE); *Merrill 7767*, Benguet subprovince, May, 1911 (US). FIG. 10.

11. T. FILAMENTOSUM Maximovicz, Prim. Fl. Amur. 13, 1859.—SIBERIA, PRIMORSK: *Palczewsky*, Vladivostok, Mt. Orlinoe Gnezdo (Eagle Nest), May 5, 1905 v. (NY); *Saverkina 99*, June (or July) 15, 1929 v. (NY); *Topping 2060*, Vladivostok and vicinity, May–Oct., 1919 (US). AMUR: *Maximovicz* (G, isotype?); *Komarov 725*, vallis fluminis Sutar, 12 junii, 1895 v. (NY, US); *Korshinsky*, 1891 v. (US); *Korshinsky*, Bidzhanskii, 8 June, 1891 (G). FIG. 11.

12. T. CLAVATUM DC. Syst. **1:** 171, 1817.—*Physocarpum clavatum* (DC.) Bercht. & Presl, O Priroz. Rostl. **1:** 14, 1823. *T. filipes* Torr. & Gray, Fl. N. Amer. **1:** 38, 1838. *T. nudicaule* Schweinitz ex Torr. & Gray, Fl. N. Amer. **1:** 39, 1838. *Sumnera clavata* (DC.) Nieuwl. Amer. Midl. Nat. **3:** 254, 1914.—*Planta* omnino glabra. *Caulis* luteolus glaber 1.5–7.0 dm. altus, persaepius solitarius et semimetralis. *Radices* paucae fibrosae nigricantes, aliquantulum ad originem tuberosae. *Folia* caulinaria biternata petiolata, saepius tamen desunt. *Foliolae* 1.0–5.0 cm. long., 0.8–6.0 cm. lat., forma variabiles, subalbicantes inferne. *Inflorescentia* subcorymbosa. *Sepala* spathulata alba, 2.5–4.0 mm. longa. *Stamina* 4–5 mm., ca. 30. *Filamenta* 3.5–4.5 mm., saepe crassiora quam antherae. *Antherae* ovoideae, 0.3–0.5 mm. long. *Ovaria* 4–11. *Carpella* matura 7 vel pauciora per receptaculum, falcato-oblanceolata, 7–8 mm. long., *stipite* 2.2–3.0 mm., ventro 4–5 mm. long., *nervo* ventrali concavo. *Stigma* ca. 0.3 mm., discoideum, insertum contra ventrem *styli* ejusdem longitudinis. Floret ab Aprili ad Junium.—VIRGINIA:

Schweinitz, Patrick Co. (ANS, type of *T. nudicaule;* NY, fragment). North Carolina: *Radford & Stewart 1787*, Wilkes Co., growing at spring in a shady bend of the road up Pores Knob Mt., north exposure, July 2, 1940 (NC); *Magee*, Lickstone Mt., June 10, 1897 (G); *Curtiss 28*, Roan Mt., moist rocky ravines, alt. 6100 ft., July (G, NY); *Churchill*, Polk Co., Melrose, May 19, 1899 (M); *Churchill*, Watauga Co., Blowing Rock, Glen-Bernie, water-fall, June 16, 1899 (M); *Biltmore Herbarium 1015b*, Biltmore, wet places, May 6th and June 18th, 1897 (G, M, NC); *M. A. Curtis*, mountains of North Carolina (NY, type of *T. filipes*). South Carolina: *Peattie*, Greenville Co., Hogback Mts. (G); *J. D. Smith*, Caesar's Head, wet rocks, Aug. 1, 1881 (G). Georgia: *Underwood*, Taccoa Falls, Apr. 20, 1891 (NY); *Leeds 2011*, Union Co., on branch of Helton Creek, 1 mile n. of Frogtown, dripping rocks, alt. 3850 ft., June 1, 1934 (ANS). Tennessee: *Ruth*, Thunder-Head Mt., border of streams, elev. 6663 ft., July, 1894 (M); *Jennison & Sharp*, Fentress Co., Jamestown, Buffalo Cave, wet sand, rock, cliffs, May 17, 1931 (US); *Svenson 8901*, Marion Co., Cumberland Plateau, about 5 miles se. of Sewanee, dripping sandstone rocks, alt. 1800 ft., June 22, 1938 (G); *Svenson 10,158*, Grundy Co., east of Tracy City, Deer Lick, in spray of waterfall, May 15, 1939 (ANS, G); *Ruth 1799*, near Wolf Creek, along a mountain brook, June, 1896 (NC, NY); *Eggert*, Franklin Co., no. of Sherwood, shady rocks, June 8, 1897 (M). Figs. 12, a–e.

The type is in the Paris Museum. It has not been studied, but the description is clear and Delessert's plate (Icones Sel., 1: tab. 6, 1820), presumably drawn from the type, represents this species beyond any doubt.

13. T. **declinatum,** sp. nov. *Planta* semimetralis, in petiolis petiolulis foliolisque infernis pubescens. *Radices* fibrosae nigricantes, paululum ad originem incrassatae. *Folia* inferiora biternata, caulinaria desunt, inflorescentiae ternata. *Foliolae* ovatae asymetricae dentatae, basi cordatae, apice acutae, ca. 4 cm. long. et ca. 3 cm. lat. *Stamina* ca. 3.5 mm. *Filamenta* ca. 3 mm., latitudinis antherarum. *Antherae* oblongae, 0.5–0.7 mm. *Carpella* matura falcata, ca. 7 mm. longa, stipite ca. 3 mm., ventre lanceolato ca. 3.5 mm. longo et 1.0 mm. lato, nervo ventrali fere recto vel parum concavo. *Stigma* ca. 0.3 mm., modo *Thalictri clavati; stylus* idem. Floret Junio et Julio.—China, kweichow: *Tsiang 5662* pro parte, Tze-min-an. Tuyun, in dense shade, flower white, alt. 880 m., July 7, 1930 (NY, type). Fig. 13, a and b.

14. T. **acutifolium** (Handel-Mazzetti), stat. nov.—*T. clavatum* DC. var. *acutifolium* Hand.-Mzt. Anz. Wiss. Wien, Math.-

nat. Kl. **63:** 8, 1926.—*Planta* 25–65 cm., glabra vel raro foliolis infernis pubescentibus. *Radices* nigricantes plus minusve tuberosae. *Folia* basilaria 2–3-ternata, caulinaria saepius desunt, inflorescentiae 1–2-ternata. *Foliolae* dentatae saepius et ovatae et basi rotundae et apice acutae, ca. 5 cm. longae. *Sepala* obovata vel spathulata, ca. 2.0 mm. longa. *Stamina* 7–9 mm. *Filamenta* multo latiora quam antheris. *Antherae* oblongo-lanceolatae ad oblongo-lineares 0.8–1.3 mm. *Carpella* matura ca. 5.5 mm. longa, stipite 2.0–2.2 mm., ventre lanceolato 3.0–3.2 mm. longo et 0.6–0.8 mm. lato, nervis lateralibus 3 in utroque latere, nervo ventrali recto vel parum convexo. Floret Martio ad Junium.—CHINA, FUKIEN: *Dunn 2316*, expedition to central Fokien, April to June, 1905 (G); *Dunn 2456A*, expedition to central Fokien, April to June, 1905 (G); *Chung 7751* (NY). HUNAN: *Handel-Mazzetti 11,173*, prope urbem Wukang, in monte Yün-schan, copiose, schisto argilloso, fl. pall.-violac., alt. 600–1300 m., June 7, 1918 (US, syntype); *Wang-Te-Hui*, March, 1919 (US). KWANGTUNG: *Ko 52,821*, Yu-yen, in field, June 8, 1933 (G); *Tso 20,535* and *20,651*, Lok Chong, May, 1929 (NY). FIG. 14, a–c.

Thalictrum clavatum DC. evidently belongs to the same section as all these eastern Asiatic species but it is not especially closely related to any of them. As far as it is possible to judge, with only the original description at hand, the fruits of *T. tenerum* Huth might resemble those of *T. clavatum* more than those of any other species except *T. mirabile* Small.

15. T. MICROGYNUM Lecoyer in Hook. Ic. Pl. **18:** 1766, 1888.—CHINA, HUPEH: *Wilson 12*, western Hupeh, April, 1900 (NY, US); *Henry 3992*, Nan-t'o, near Ichang, 1885–1888 (G, ISOTYPE). SZECHWAN: *Faber* 135 (NY); *Farges 496*, district de Tchen-Kéou, alt. 1400 m., juin (NY). KWANGTUNG: *Tso 20,651*, Lokchong district, May 24, 1929 (NY). FIG. 15.

The plate acccompanying the original description is a very good representation of the fruiting stage of this species.

16. T. **unguiculatum,** sp. nov. *Planta* semimetralis. *Folia basilaria* biternata. *Folia caulinaria* desunt. *Folia inflorescentiae* ternata. *Petioli* et *petioluli* pubescentes. *Foliolae* cordatae acutae dentatae, nec lobatae, inferne pubescentes. *Inflorescentia* paniculata. *Sepala* viridia, 3.0–4.5 mm. longa, conspicue trinervata, basi pubescentia, unguiculata, *lamina* orbicularia. *Carpella* matura viridia, 3.5–4.5 mm. longa, *stipite* 1.5–2.0 mm., ventre rhomboideo vel obovato 1.5–2.0 mm. longo et 0.8–1.0 mm. lato, *nervis* obscuris, stylo ca. 4 mm., *stigmate* ca. 0.2 mm. ad ventrum *styli* inserto. Floret vero-

similiter Junio.—China, kweichow: *Tsiang 5662* pro parte, Tze-min-an, Tuyun, in dense shade, alt. 880 m., July 7, 1930 (G, type). Fig. 16, a and b.

17. T. **Gueguenii,** sp. nov. *Planta* gracillima, viridula, omnino glabra, 1.0–2.5 dm. *Caulis* tenuis. *Folia* basilaria biternata, inflorescentiae ternata. Caulinaria desunt. *Foliolae* fere orbiculares crenatae 1–2 cm. *Flores* pauci, saepius 3–5. *Sepala* alba spathulata ca. 2.5 mm. longa. *Stamina* ca. 5 mm. *Filamenta* insensibiliter clavata, fere latitudinis antherarum. *Antherae* ellipticae, 0.4–0.8 mm. *Carpella* matura symetrica ca. 7 mm. longa, *stipite* ca. 3.5 mm., ventre lanceolato ca. 3.2 mm. longo, 0.6–0.8 mm. lato, *stigmate* sessili et discoideo. Floret Aprili ad Junium.—China, kiangsi: *Gressit 1455,* Hing San, near border of Fukien, grassy rocky ridge, alt. 1300 m., June 23, 1936 (G). hunan: *Tsang 23,486,* Yi Chang district, P'ing T'ou Shan, Pai Mu village, silt, swamp, fairly common, Apr. 1–11, 1934 (G, type; US, isotype); *Tsang 23,392,* Yi Chang district, P'ing T'ou Shan, Pai Mu village, steep slope, sandy soil, thicket, fairly common, flowers white and fragrant, March 21–29, 1934 (G, US). Fig. 17, a–c.

Dedicated to Émile Gérard Guéguen, a former teacher of mine, of Belgian origin, a self-effacing, conscientious hard worker. To him I owe a good deal of what training and information were inculcated into me while going through college; to him I also owe a deep and permanent interest in science.

18. T. mirabile Small, Bull. Torr. Bot. Club, **27**: 277, 1900. *Planta* glabra gracilis 15–45 cm. *Radices* nigricantes ad originem tuberosae. *Caulis* basus saepius valde incurvatus, quia planta illa sponte crescit in locis praecipitosis et lateraliter inseritur in fissuris murorum saxosorum. *Sepala* alba obovata vel spathulata, 1.5–2.5 mm. longa. *Stamina* 2–4 mm. longa. *Filamenta* crassiora quam antherae. *Antherae* globosae vel ovoideae, 0.3–0.4 mm. *Ovaria* saepius 3. *Stigma* discoideum vel ellipticum, 0.1–0.4 mm. longum, insertum ad ventrum styli. *Carpella* matura 5.5–7.5 mm. longa, *stipite* 2.5–3.0 mm., ventre obovato vel semiobovato 2.5–4.0 mm. longo et 1.0–1.2 mm. lato, *nervis* lateralibus 3 in utroque latere, nervo ventrali fere recto vel paululum convexo, dorsali multo convexiore. Floret Maio, Junio Julioque.—Kentucky: *S. F. Price,* torrent (M); *Leeds 2107,* McCreary Co., Cumberland Falls, woods, June 21 1934 (ANS); *Smith, Hodgdon & Brown 3662,* Madison Co., Cowbell Hollow, east of Berea, July 7, 1937 (F, G, NY, US); *Smith & Hodgdon 3928,* Wayne Co., Beaver Creek, southwest of Monticello, shady dripping ledge, July 12–14, 1937 (ANS, G, US). Alabama: *Mohr,* Winston Co., dripping rocks of mts., May 1,

1882 (US); *Mohr*, Winston Co., ad saxas madidas, in sylvis montosis, radicibus tuberosis, May 4, 1881 (F); *Mohr*, Winston Co., Davidsons Creek, dripping rocks in the mountains, May 1, 1881 (US); *R. M. Harper 3400*, Franklin Co., Dismal Branch, under sandstone cliffs on damp sandy bank, June 17, 1935 (ANS, G, N-ND, NY, US); *Earle 2212*, Little Mountain, near Moulton, under sandstone bluff, June 25, 1899 (NY, TYPE and ISOTYPE). FIG. 18, a–c.

It is surprising that this plant has not been collected at intervening localities in Tennessee. Fruits and stamens of the Kentucky specimens tend to be larger, but all characters overlap to some extent.

19. T. TUBERIFERUM Maximovicz, Bull. Acad. Imp. Sc. St. Pét. **22:** 227, 1877 [1876].—NIPPON, HONDO: *Tschonoski*, prov. Senano, 1864 (G, syntype); *Arimoto*, Mt. Iwate, July 15, 1903 (G); *Shimotsuke*, Nikko, Aug. 8, 1910 (US); *Enander*, prov. Shimatsuke, in radicibus montis Nantai-San in ripa lacus Chutzanji, 14 km. procul a Nikko, Aug. 14, 1913 (G); [*Watanabe?*] Shinshu, Togakushi, June 10, 1894 (G, US); [*Watanabe?*], Shinano, Togakushi-san, Aug. 18, 1893 (G); idem, Aug. 20, 1893 (US); *Hogg* (NY). COREA: *Komarov*, distr. Sam-su, fluvium Jalu, trajectus Shanjen, julio 7, 1897 v. (G). MANDCHURIA: *Komarov*, prov. Kirinensis, dist. Omoso, trajectus Sangta-alin, julio 24, 1896 v. (NY); *Maximowicz*, circa estuarium St. Olgae, 1860 (G, syntype); *Jankowski*, ad fl. Sedemi (NY). FIG. 19.

20. T. WATANABEI Yatabe, Bot. Mag. Tokyo, **6:** 307, 1892. —NIPPON, HONDO: [*Watanabe*]?, Tosa prov., Nanokawa, July 11, 1892 (US, ISOTYPE?); [*Watanabe*?], Tosa prov. Nanokawa, July 11, 1893 (G). FIG. 20.

I have at hand a fairly large number of Japanese plants, the labels of which are all in the same fashion, style and handwriting, but there is no collector's name on any of them. However, one of them, *T. acteaefolium* Sieb. & Zucc. from Nanokawa, Tosa, has a second label which reads: "Plants of Japan, Coll. K. Watanabe, Purchased 1892". I presume all these specimens were collected by K. Watanabe, hence I have cited them all as [*Watanabe*?]. If this assumption is right, there is an ISOTYPE of *T. Watanabei* Yatabe at the Smithsonian Institution and perhaps also at the Gray Herbarium, for the labels of those two specimens would read exactly alike were it not for the year. This similarity, enhanced by the fact that the two sheets resemble each

other as plants from the same collection usually do, and the fact that the original description and its accompanying plate could have been drawn from these specimens without being in any way different,—all this strongly suggests that both specimens are isotypes.

T. Hayatanum Koidz. seems to be closely related to *T. Watanabei* Yatabe, but I have not seen any material of the former.

21. T. **Chiaonis,** sp. nov. *Planta* glabra 20–40 cm. *Radices* nigricantes variis modis tuberosae. *Foliolae* saepius ellipticae, crenatae vel dentatae. *Inflorescentia* corymbosa vel, si elongata, *flores* in ramis singulis corymbosae. *Sepala* obovata ca. 2.5 mm. longa. *Stamina* 3.0–3.5 mm. *Filamenta* latitudinis antherarum vel latioria. *Antherae* oblongae vel oblongo-lanceolatae, 0.4–0.8 mm. *Stigma* 0.3–0.6 mm., discoideum vel ellipticum, insertum ad ventrum *styli* brevissimi, vel ovarii apicalis. *Carpella* matura 6–8 mm. longa, *stipite* 1–3 mm., ventre lanceolato 4.0–5.3 mm. long. et 0.8–1.5 mm. lat., *nervis* lateralibus 1–3 in utroque latere, nervo ventrali plus minusve convexo, dorsali convexiore. Floret Junio Julioque.—Corea: *Uno 23,694*, Kanrasan Saisyuto, Zenranando, alt. 1700 m., Aug. 13, 1938 (G). China, anhwei: *Ching 8593*, Wang Shan, July 15, 1925 (US). kiangsi: *Chiao 18,719*, Kuling, along rocky slope, alt. 3400 ft., July 27, 1928 (NY, type; US, isotype); *Steward 2495*, Lu Shan, rocky ridge, July 17, 1922 (NY, US). Fig. 21, a and b.

22. T. integrilobum Maximovicz, Bull. Acad. Imp. Sc. St. Petersb. **32:** 477, 1888, reeditum Mél. Biol. **12:** 714, 1888.—Nippon, yezo: *Miyabe*, prov. Hidaka, Samani mountain path, June 19, 1884 (G).

23. T. ichangense Lecoyer in Hook. Ic. Pl. **18:** 1765, 1888.—China, hupeh: *Henry 6223*, 1885–1888 (G, US); *Wilson 492*, western Hupeh, May, 1900 (G, US); *Ho-Ch'ang Chow 355*, Tzu Kwei Hsien, May 27, 1934 (NY); *Ho-Ch'ang Chow 562*, Patung Hsien, June 17, 1934 (NY). yunnan: *Maire 2656* (NY, US). French Indochina: *Pételot 3063*, Chapa, juillet, 1927 (US).

24. T. coreanum Léveillé, Bull. Acad. Int. Géog. Bot. **11:** 297, 1902.—Corea: *Wilson* 9215, prov. s. Kankyo, 12½ miles from Eiko, roadsides, common, Sept. 22, 1917 (US). Fig. 23.

The status of this species is open to question and the material at hand is not satisfactory.

Sectio Omalophysa Turcz. ex Fisch., Mey. & Lall., Index Sem. Hort. Petrop. **1:** 40, 1835.—*Plantae* pubescentes pilis brevibus capitatis. *Flores* perfecti, *filamentis* staminum parum apice dilatatis albis. *Carpella* stipitata valde compressa, cum matura, *nervis* rugosis attamen nunquam elevatis in costis.

Rostrum deflexum ad tergum. Species typica: *T. sparsiflorum* Turcz., ut patet e descriptione originali.

It seems likely that *T. Przewalskii* Max. belongs here although we do not have any herbarium material which would permit checking this particular point.

25. T. SPARSIFLORUM Turcz.—*Planta* elegans plus minusve pubescens, 30–180 (saepius 75) cm. alta. *Pubescentia* translucida et minutissima e pilis capitatis. *Radices* fibrosae. *Folia* 3–4-ternata, basilaria aetate florendi saepius desunt, caulinaria saepe 5 in plantis singulis, plus minusve petiolata, superioribus exceptis, ista vero cum foliis etiam inflorescentiae omnibus semper sessilia sunt. *Stipulae* auriculatae erosae. *Stipellulae* desunt. *Foliolae* inferne paululum pallidiores, superne glabrae, circuitu variabili, saepius tamen basi vel rotundae vel cordatae, apice vel crenatae vel trilobatae. *Inflorescentia* foliosissima. *Flores* albi. *Sepala* elliptica 3–4 mm. longa. *Filamenta* apice paullum incrassata saepius dimidium latitudinis antherarum. *Antherae* ovatae vel oblongae parum si vero mucronatae. *Ovaria* laminaria stipitata. *Stigma* 0.5–1.0 mm., una cum stylo 1.0–1.5 mm. *Carpella* matura valde compressa semi-obovata, *nervis* lateralibus non-nunquam ramosis nec tamen sinuosis. *Rostrum* deflexum ad tergum et paululum incurvatum. Floret junio julioque aliquandiu augusto etiam.

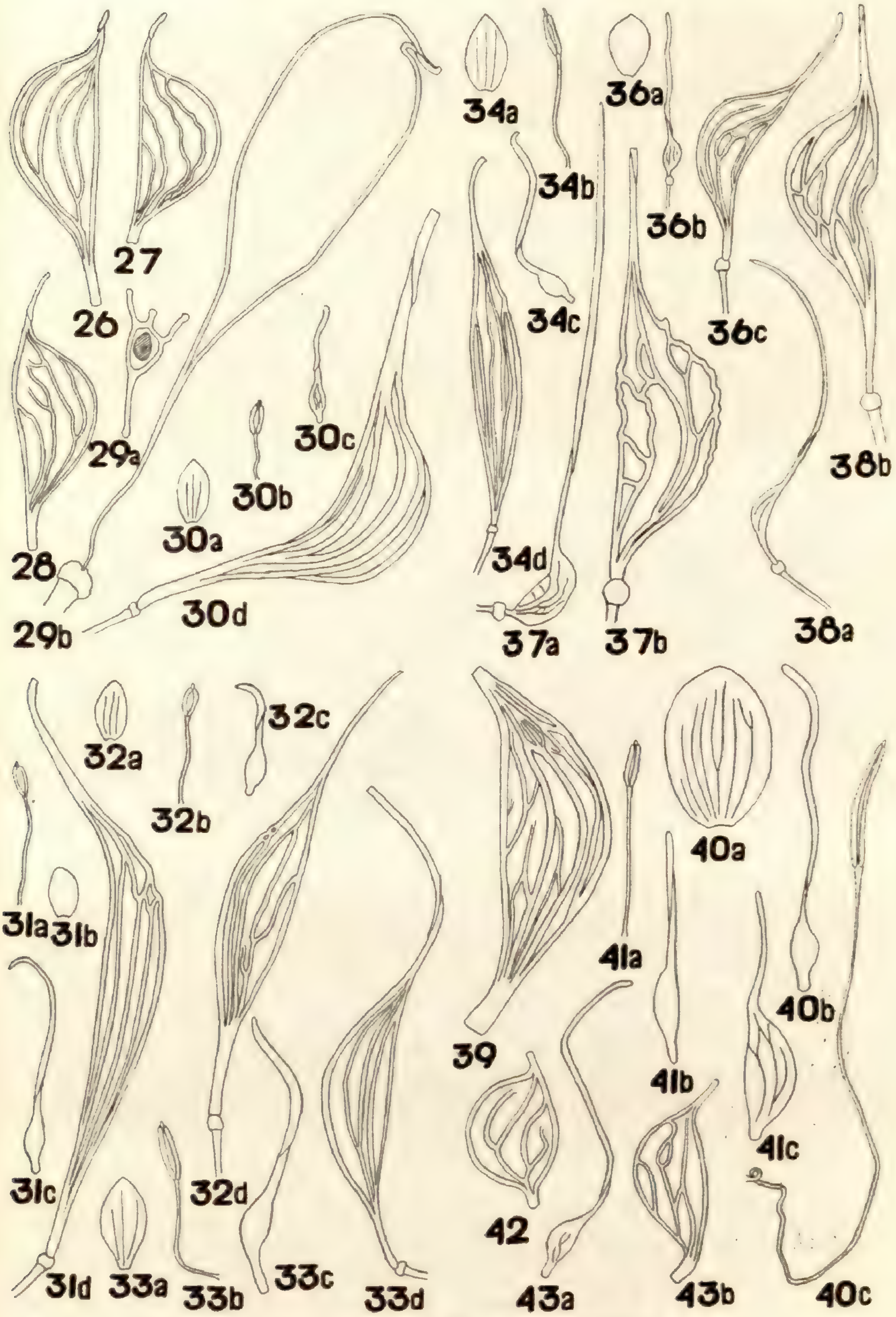
The type is at Leningrad and was collected in Dahuria by Turczaninow. Not seen. The four following varieties seem to be worth recognition, although their characters overlap to some extent and notwithstanding an occasional intermediate specimen. The latter are never hard to classify, for each variety has a clear-cut geographic distribution and no two varieties occur in the same region.

25. T. SPARSIFLORUM Turcz., var. **typicum.** *T. sparsiflorum* Turczaninow ex Fisch., Mey. & Lall. Index Sem. Hort. Petrop. **1:** 40, 1835. *T. contortum* Fischer ex Lec. Bull. Soc. Bot. Belg. **24:** 317, 1885, nomen nudum pro synon., nec *T. contortum* L. Sp. Pl. **1:** 547, 1753.—*Pedunculi* omnes ex axillis foliorum 1–3-ternatorum. *Filamenta* 4.5–6.0 mm. *Antherae* 0.8–1.0 mm. *Carpella* matura glabra ca. 8 mm. longa *stipite* ca. 1.5 mm., ventre ca. 4.5 mm. longo et ca. 2.0 mm. lato, apice acuto, *nervo* dorsali concavo.—SIBERIA, YENISSEISK: *Schipezinsky 75*, distr. Krasnojarsk, ad fl. Kas., 18 junii 1927 (NY). AMUR: *Komarov 724*, vallis Sútàr, prope stationem Liubavisky, 14 junii 1895 v. (G, NY). FIG. 25, a and b.

26. T. SPARSIFLORUM Turcz., var. **Richardsonii** (Gray), stat. nov. *T. clavatum* sensu Hooker, Fl. Bor.-Amer. **1:** 2, 1829, nec

sensu DC. Syst. **1:** 171. 1817. *T. Richardsonii* Gray, Amer. Journ. Sci. **42:** 17, 1842.—*Pedunculi* omnes ex axillis foliorum 1–3-ternatorum. *Filamenta* 3.0–4.5 mm. *Antherae* 0.5–1.0 mm. *Carpella* matura glabra 7.5–10.0 mm. longa, *stipite* 1.2–3.0 mm., ventre 4.5–6.0 mm. longo et (2.3)–2.5–(3.0) mm. lato, apice truncato, *nervo* dorsali recto vel parum convexo.—"Canada": *Franklin Expedition* (G, paratype of *T. Richardsonii*). Alberta: *Hitchcock 12,070*, Athabasca Landing, July 28, 1914 (US); *Brinkman 4169*, Slave Lake Distr., Nratauway River (Salteau), wettish spots in forest, June 6, 1929 (NY); *Richardson*, Slave Lake, Portage la Loche (G, fragment of type of *T. Richardsonii*); *Raup*, eastern edge of Caribou Mountain plateau, about 114° 9′ W., 58° 51′ N., muskeg along creek, July 12, 1930 (G). British Columbia: *Kay*, Lake Ailoknajik, 1883 (G); *McCabe 7678*, Omineca River, Germansen Landing, in boggy ground in alder, cottonwood and small spruce woods, flowers dull white, not red, July 4, 1940 (UC); *Anderson 7566A*, Hazelton, open woods, June 19, 1925 (N-ND). Yukon: *Eastwood 224*, Dawson, Bonanza Creek, June 13, 1914 (G); *Macoun 58,344*, mouth of Bonanza Creek, Aug. 11, 1902 (F, NY); *Williams*, mouth of Klondike, July 9, 1899 (NY); *Tarleton 64*, Five Finger Rapids, July 5, 1899 (NY). Alaska: *Coville & Kearney 2345*, Kodiak, July 20, 1899 (G); *Mylroie 128*, Kodiak, 1910 (NY); *E. H. & H. B. Loof 42*, Kodiak, Olga Bay, wet places in valleys, July 5, 1938 (N-ND, NY); *E. H. Loof 42*, Kodiak, Alitak, June–July, 1937 (G); *Eyerdam 19*, Kodiak, Sitkalidak Isl., Port Hobron, July 27, 1931 (NY); *Harrington 1*, Nagai I., Sanborn H., 1871–1872 (ANS, G, NY); Unalaska (NY); *Kellogg 211*, Unalaska, subalpine, 1867 (ANS, G); *McKay*, Nushagak, island above tide-water, June 25, 1881 (ANS); *Horne*, Karluk, sparse but common in rich lower banks, July, 1901 (NY); *Scamman 210*, Fairbanks, Aug. 10–20, 1936 (G); *Chapman 42*, Anvik, north end of island in Anvik River opposite mission, Aug. 15, 1906 (G); *Anderson 6654*, Hope, wet woods, June 8, 1941 (G); *Anderson 2 A 293*, Boat Harbor, Lynn Canal, in grass near beach, Aug. 11, 1925 (G); *Anderson 916*, Matanuska, July 8, 1931 (G); *Anderson 7079*, Manly Hot Springs, July 5, 1941 (G); *Mexia 2185*, McKinley National Park, hills west of Wonder Lake, in damp hollow, alt. 800 m., Aug. 4, 1928 (ANS, G, NY); *Scamman 1609*, Curry, June 12, 1940 (G); *Martel 76*, Fox Bay, stream-bank, Aug. 2, 1935 (G). Siberia, primorsk: *Eyerdam*, Kamtchatka australis, Savoiko, 29 julii, 1928 (G); idem, 31 julii 1928 (F); *Tiling*, Ajan (G).

T. Richardsonii Gray: fragment of type and a paratype at the Gray Herbarium. Hooker and Gray at first called this plant *T. clavatum* DC. Having seen true *T. clavatum* DC. during a trip in the Southern Appalachian upland, Gray proposed the name



DETAILS OF FLOWERS OR FRUITS OF THALICTRUM, all × 4.

(For explanation see end of paper.)

T. Richardsonii for *T. clavatum* sensu Hooker. But later on, probably after receiving a specimen of the same species from Ajan, Gray, in Pl. Wright. **2:** 8 (270), 1853, dropped *T. Richardsonii* in favor of *T. sparsiflorum* Turcz. Fig. 26.

27. T. SPARSIFLORUM Turcz., var. **saximontanum,** var. nov. *T. utahense* Greene ex Rydb., Fl. Rock. Mts., 289, 1918, nomen nudum ex synonymis.—Nonnunquam pauci *pedunculorum* ex axillis bractearum, ceteri ex axillis foliorum 1–3-ternatorum. *Filamenta* 3.5–4.5 mm. *Antherae* 0.5–1.0 mm. *Carpella* matura pubescentia 6.0–8.5 mm. longa, *stipite* (0.3)–0.5–(1.0) mm., ventre 4.0–5.5 mm. longo et (2.2)–2.5–(3.2) mm. lato, summo truncato vel obtuso, *nervo* dorsali fere recto, nervis lateralibus nonnunquam undulatis et ramosis.—MONTANA: *Rose 61*, Carbon Co., near Red Lodge (CA). IDAHO: *Eggleston 13,980*, Custer Co., Challis Forest, Morgan Creek, Taylor's ranch, ca. 1940 m., July 29, 30, 1917 (G); *E. B. & L. B. Payson 2109*, Teton Co., hills southeast of Victor, wooded creek-banks, alt. 6200 ft., July 24, 1920 (CA, G); *Macbride 593*, Elmore Co., Trinity, creek-banks, alt. 4500 ft., Aug. 12, 1910 (G); *Macbride & Payson 2945*, Blaine Co., Camas Prairie, in shade of creek-bottom, alt. 5700 ft., June 29, 1916 (G); *E. B. & L. B. Payson 2013*, Fremont Co., Henry Lake, creek-banks, alt. 6000 ft., July 14, 1920 (CA, G); *Macbride & Payson 3283*, Custer Co., Bear Creek, wet creek-banks, alt. 6000 ft., July 18, 1916 (CA, G); *Henderson 3372*, Blaine Co., near Ketchum, July 23, 1895 (CA). WYOMING: *L. Williams 1671*, Grand Teton National Park, Cascade Creek, moist bottoms, alt. 7500 ft., July 7, 1934 (CA); *L. Williams 855*, Grand Teton National Park, in timber, moist places, alt. 7000 ft., July 14, 1932 (CA, G); *A. & E. Nelson 6364*, Yellowstone Park, Lewis River, on the banks of the river, Aug. 8, 1899 (G, TYPE of var. *saximontanum*); *L. O. & R. Williams 3186*, Big Horn Co., Shell Creek, near the mouth of Antelope Creek, sandy rocky creek-bottom, alt. 8500 ft., June 30, 1936 (G); *A. Nelson 7970*, Albany Co., Little Laramie, Middle Fork, in wet willow thickets, very common, Aug. 6, 1900 (G); *Goodding 408*, Big Horn Co., Ten Sleep Creek, shaded creek-banks, July 30, 1901 (G); *Merrill & Wilcox 913*, Lincoln Co., Leighs Lake, Jacksons Hole, damp soil, July 24, 1901 (G); *A. Nelson 1548*, Cummins, alt. 8000 ft., July 30, 1895 (G); *A. Nelson 1494*, Cummins, July 29, 1895 (G). COLORADO: *Parry 76*, from the headwaters of Clear Creek and the alpine ridges lying east of Middle Park, 1861 (G); *Parry 9*, Rocky Mountain Flora, 39°–41°, 1862 (US); *Parry 76*, 39°–41°, alpine and subalpine, 1862 (G); *Hall & Harbour 9*, Rocky Mts., alpine, 39°–41°, 1868 (G); *Vasey 7, 9*, Rocky Mts., Grand Lake, 40°–41°, 1868 (G, US); *Zobel*, Middle St. Vrain River, July 12, 1939 (CA); *Hapeman*, Poudre Canyon,

alt. 7500 ft., Aug. 24, 1936 (CA); *Walker 478*, San Miguel Co., Norwood Hill, moist north slope by river, alt. 7000 ft., Aug. 17, 1912 (G); *Crandall 33*, near Georgetown, along stream, alt. 847.4 ft. [sic], July 20, 1892 (G); *Churchill*, Clear Creek Co., Brookvale, Yankee Creek, thicket, June 22, 1918 (G); *Patterson*, vicinity of Georgetown, Bard Creek near Empire, June 28–Aug. 7, 1875 (F). UTAH: *M. E. Jones 5731a, 5731b*, Sevier Co., Fish Lake, alt. 9000 ft., Aug. 3, 1894 (US); idem *5789*, Aug. 6–7 (NY, US); *E. B. & L. B. Payson 4970*, Summit Co., Uintah Mts., Stillwater Fork of Bear River, in deep shade near stream-bank, alt. 8800 ft., July 15, 1926 (G); *Goodman & Hitchcock 1482*, Summit Co., Uintah Mts., E. Fork of Bear River, meadow, edge of small stream, alt. 8900 ft., July 9–13, 1930 (G); *Graham 10,087*, Uintah Co., between Paradise Park and Chepeta Lakes, lodgepole-spruce woods, along stream, alt. 10,300 ft., Aug. 20, 1935 (G). OREGON: *Cusick 3357a*, Wallowa Mts., in a swamp of North Catherine Creek, very rare, alt. about 4500 ft., Aug. 31, 1910 (G). FIG. 27.

28. T. SPARSIFLORUM Turcz., var. **nevadense,** var. nov. *Pedunculi* nonnunquam pauci ex axillis bractearum, plurimi vel omnes ex axillis foliorum 1–3-ternatorum. *Filamenta* ca. 4 mm. *Antherae* 0.7–1.0 mm. *Carpella* matura pubescentia 7.5–8.0 mm., *stipite* millimetri, ventre 4.5–6.0 mm. longo, 2.2–2.5 mm. lato, summo rotundo vel obtuso, *nervo* dorsali convexo vel summo convexo et basi concavo.—NEVADA, ESMERALDA: *Duran 3354*, White Mountains, Trail Canyon, alt. 9800 ft., July 20, 1932 (CA, G, UC). CALIFORNIA: *Lemmon*, Webber Lake, Oct., 1890 (UC); *Campbell*, Kearsarge Pass, on east side, July 29, 1916 (CA); *Michaele*, Yosemite, Pohono trail, July 19, 1922 (CA); *Redfield*, prope lacus Tahoe, in paludibus, Sept. 1, 1872 (M). CALIFORNIA, LASSEN: *Nutting & Baker*, Pine Creek, July 12, 1894 (UC). SHASTA: *Eastwood 1913*, Lassen Butte region, Battle Creek meadows, Aug. 22–26, 1912 (G, M, UC); *Austin*, Big Spring, 4–6 ft. high, weak, supported by bushes, July 4, 1878 (G); *Brown 610½*, near Lassen Buttes, alt. 6000 ft., Aug. 1–15, 1897 (M); *Austin*, near Lassen Peak, Warner Valley, 1879 (G). BUTTE: *Copeland*, Jonesville, above Butte Creek House, alt. 1800 m., Aug. 26, 1930 (UC). SIERRA: *Sonne*, Little Truckee River, fls. July 10, 1892, fr. Aug. 7, 1892 (UC). NEVADA: *Heller 7056*, on the Truckee River, one mile above Truckee, July 30, 1903 (G, TYPE; M, UC, ISOTYPES). PLACER: *Sonne*, road to Hot Springs, fl. June, 1896, fr. July, 1896 (NY). ELDORADO: *Hillman*, Lake Tahoe, Bijou, Sept. 15, 1894 (UC); *Crum 3011*, two miles southeast of Echo Lake, Echo Summit, alt. 7500 ft., subalpine zone, wet soil, shade, July 3, 1939 (UC). TUOLUMNE: *Mason 680*, Sierra Nevada Mts., Lyell Fork, Aug. 1, 1923 (UC). MARIPOSA: *Babcock 281* (*1097*), Yosemite Nat.

Park, Illilouette Canon, on first branch of Illilouette Creek, above the falls, growing in bogs, abundant here but apparently not common in the middle Sierra Nevada, alt. 1955 m., June 28, 1912 (CA, G, M, UC). MONO: *Wright*, Mono Lake, July 18, 1917 (CA). MADERA: *Congdon*, Upper San Joaquin, Aug. 19, 1895 (UC). FRESNO: *Hall & Chandler 142*, Pine Ridge, alt. 5300 ft., June 15–25, 1900 (UC). INYO: *Rose 35,462*, Ibex Park, E. slope, meadows, alt. 10,300 ft., July 24, 1935 (CA); *Peirson*, Rock Creek Lake Basin, margin of lake on east side of canyon and at base of Transverse Ridge, alt. 10,700 ft., Aug. 5, 1940 (UC); *Peirson*, Rock Creek Lake Basin, near Ruby Falls, in wet locations, alt. 10,900 ft., Aug. 19, 1933 (UC); *Alexander & Kellogg 2581*, Big Pine Creek, trail between 2nd and 3rd lakes, in rank vegetation near small creek, July 16, 1941 (UC); *Halperin 579A*, Rock Creek, alt. 10,000 ft., July 31, 1932 (CA); *Ferris 8866*, Loch Leven Fork of Bishop Creek above North Lake, dry slopes in lodgepole pine forest, July 21, 1934 (UC). TULARE: *Hopping 352*, Kaweah River Basin, Round Meadow, Sept. 16, 1905 (UC); *Hopping 376*, Kaweah River Basin, Giant Forest, July 20, 1904 (UC); *J. T. Howell 17,513*, Chagoopa Plateau, Sky Parlor Meadow, Aug. 1, 1942 (CA); *J. T. Howell, 15,700*, East Lake, July 30, 1940 (CA); *Cronquist 2132-A*, Sequoia Nat. Park, 3 miles from Giant Forest, Crescent Meadow, alt. about 7000 ft., June 27, 1940 (M). SAN BERNARDINO: *L. C. Wheeler 1186*, San Bernardino Mts., S. Fork Santa Ana R., sunny stream-side, alt. 8400 ft., Aug. 21, 1932 (CA); *Abrams 2842*, San Bernardino Mts., Bear Valley, alt. 6700 ft., Aug. 1, 1902 (G, M); *Abrams & McGregor 765*, San Gorgonio Mt., Dollar Lake Canyon, alt. 9000–9500 ft., July 12, 1908 (G); *S. B. & W. F. Parish 1484*, San B. Mts., Bear Valley, Aug., 1882 (G); *Munz 12,676*, San B. Mts., South Fork of Santa Ana River, in meadow, about willows, etc., foetid plant, alt. 8300 ft., Aug. 21, 1932 (M, UC); *Munz 10,617*, San B. Mts., Bluff Lake Meadow, shade of willows, with foetid odor, alt. 7400 ft., July 5, 1926 (UC); *Munz 6267*, San B. Mts., So. Fk. of Santa Ana, common in wet meadows, alt. 8000 ft., Aug. 25, 1922 (UC); *M. E. Jones*, San B. Mts., Bear Valley, alt. 6600 ft., July 19, 1900 (CA, UC); *Johnston*, San B. Mts., Bluff Lake, shaded margin of meadow, alt. 7500 ft., July 5, 1924 (G); *J. T. Howell 2760*, San B. Mts., Riverside Municipal Camp, Mill Creek Road, moist partially shaded stream-bank, alt. 7300 ft., July 10, 1927 (CA); *Grant 1287a–6351*, San Gorgonio Mt., July 24, 1904 (CA, UC); *Anderson*, grade south of Bear Lake, moist soil, alt. 7000 ft., July 24, 1935 (C-UC). RIVERSIDE: *Spencer 2259*, San Jacinto Mt., in sylvis, alt. 6000 ft., julio, 1923 (G). OREGON, KLAMATH: *Thompson 12,322*, Crater Nat. Park, along Annie Creek, under shade, alt. 5000 ft., July 26, 1935 (CA, G, NY). FIG. 28.

Sectio TRIPETRIUM DC. Syst. **1:** 169, 1817. *Tripetrium* (DC.) Bercht. & Presl, O Priroz. Rostl. **1:** 14, 1823. Subg. *Tripetrium* (DC.) Reich. Cons. Regn. Veg. 192, 1828. *Ruprechtia* Opiz, Sez. Rost. Kve. 86, 1852.—*Filamenta* staminum dilatata. *Carpella* matura valde tri-quadrialata, longe stipitata, *rostro* ad ventrum deflexo. *Stigma* brevius. Species typica *Thalictrum aquilegifolium* L. sit.

All names proposed for this group are clearly based on *T. aquilegifolium* L. De Candolle himself included two species in this section, and one of the two may be a synonym of *T. aquilegifolium* L. This species was also proposed as a standard species for the genus *Thalictrum*, but there was an earlier and better proposal: *T. foetidum* L. (See p. 347 for discussion of this topic). This section is not represented in America.

29. T. AQUILEGIFOLIUM L., var. TYPICUM Beck, f. **Cornuti** (L.), stat. nov. *T. Cornuti* L., Sp. Pl., **1:** 545, 1753. *T. canadense* Miller, Gardener's Dict. ed. 8, 1768. *T. confertum* Moench, Hort. Marburgensis, 297, 1794. *Leucocoma canadensis* (Miller) Nieuwland, Amer. Midl. Nat. **3:** 254, 1914.—A varietate typica differt filamentis staminum albis. TYPE, not seen, in the herbarium of Clifford at the British Museum of Natural History. FIG. 29, a and b.

There is in America no species corresponding to Cornut's description, and the plant is not represented in the Linnaean Herbarium, Lecoyer, however, saw the specimens under that name in the herbaria of the Hortus Cliffortianus, of Vaillant, of Tournefort and of the Academy of St. Petersburg, and states that they all belong to *T. aquilegifolium* L. Thus it seems that the plant cultivated by Cornut was later widely distributed in European botanical gardens and, although he left no herbarium specimens, we still have good material by which to interpret what he meant. But this has been strongly contested by many authors.

In 1635, when Cornut published his *Thalictrum canadense*, Canada had been explored from the Gulf of Saint Lawrence to the Great Lakes, a region where six species grow: *T. alpinum* L., *T. polygamum* Muhl., *T. dasycarpum* Fisch. & Lall., *T. revolutum* DC., *T. confine* Fern. and *T. dioicum* L.

If one reads Cornut's description he will see that the height of the plant (bicubitalis) eliminated *T. alpinum* L. The color of the stamens (mille alba filamenta ostendunt) eliminated *T.*

alpinum, *T. confine* and *T. dioicum*. The number of sepals per flower (singuli in quinque folia divisi) eliminated all but *T. alpinum*. The flowering time (julio mense singula filamenta dum deficiunt) eliminated *T. polygamum*, *T. revolutum* and *T. dasycarpum*. And the form of the fruit (triangularisque formae, extante quadam per singulos angulos epiphysi membranea) not only eliminated all six species but sufficed alone to characterize *T. aquilegifolium* L.

If we now turn to Cornut's plate, the stipellules, which are very clearly represented indeed, eliminate all eastern North American species. But the habit and the flowers suggest *T. polygamum*. The habit and the flowers also suggest *T. aquilegifolium* as well. It is true that the latter has perfect flowers and there is not a word about the ovaries in the text nor are they represented in the drawing. But anyone who has seen *T. aquilegifolium* L. in bloom has not seen any ovary unless he suspected their presence and carefully dissected a flower. For the ovaries are few, filiform, very small and hidden in the middle of the flower amidst the bases of the stamens. If anyone sees the plant in bloom and comes back to it a week or two later to find no trace of the stamens but only already well developed fruits, he will certainly get the impression which Cornut seems to have intended the following words to convey: "julio mense singula filamenta dum deficiunt, in totidem semina degenerant".

De Candolle first seems to have realized this error and he proposed *T. corynellum* for the American plant hitherto called *T. Cornuti* L. In 1910, Greene[1] protested against dropping Linnaeus' name to replace it by the very ambiguous one coined by Muhlenberg. He suggested that Cornut might have received his material through Dr. M. Sarrazin and, by mistake, described the flowers of *T. polygamum* but the fruits of *T. aquilegifolium*. This point of view was endorsed by Farwell[2] and others.

As pointed out above, not only the fruits, but also the flowers and the foliage of *T. canadense* Corn. differ from those of *T. polygamum* Muhl. And Dr. Sarrazin's manuscript, a copy of which is preserved at Saint-Hyacinthe near Montréal, reads as follows:

[1] Leaflets, 1: 51, 1910.
[2] Papers Mich. Acad. Sci. 26: 10, 1941.

178 Thalictrum Canadence, caule purpurascente, aquilagiae foliis, florum staminibus albis I.R.H. 271. Canadense Corn. 186.

Il croît sur les bords des rivières, dans les prairies.

Cornut having written in 1635, this point needs no further discussion. Indeed, Dr. Sarrazin lived from 1659 to 1734.

Greene also suggested that, Cornut's plant having been described from cultivated material, it might be possible to find it in European botanical gardens. Well, what Linnaeus, Tournefort and Vaillant had and called *T. canadense* Corn. was *T. aquilegifolium* L., but Bernard de Jussieu had in his herbarium both *T. aquilegifolium* L. and *T. polygamum* Muhl. labelled *T. canadense* Corn.

T. canadense Miller. The intention of Miller was certainly not to describe a new species, for he calls it *T. canadense* Cornut. Only through the rules of nomenclature is this name attributed to Miller.

Thalictrum confertum Moench. Described from plants cultivated in a botanical garden, no type being known to exist. Moench gives *T. Cornuti* L. as a synonym and his description agrees perfectly well with *T. aquilegifolium* L. in bloom.

Thus it seems probable that, through exchanges between botanical gardens, the stock of seeds which furnished *T. Cornuti* L. also furnished *T. canadense* Miller and *T. confertum* Moench. At any rate, it seems to be the only sensible explanation.

In his herbarium, now at the Smithsonian Institution, Mohr had a small fragment of *T. aquilegifolium* L. purportedly collected by Prof. Riddell in 1839 in Ohio and it was identified as *Thalictrum dioicum* L., var. *stipitatum* T. & Gr. Undoubtedly it was from cultivated plants.

(To be continued)

AMERICAN THALICTRA AND THEIR OLD WORLD ALLIES

Bernard Boivin

(*Continued from page 377*)

Subgenus **Lecoyerium,** subg. nov. *Inflorescentia* paniculata, rarissime subcorymbosa. *Flores* dioici vel polygami vel monoici vel in paucis perfecti. *Sepala* 4–(6), superantur *stigmatibus* tempore anthesis. Species typica *Thalictrum dioicum* L. sit.

Sectio **Cincinneria** sect. nov. Sect. *Camptogastrum,* b. *Macrocarpa* Prantl, Nat. Pfl. **3,** 2:66, 1888.—*Plantae* elatae; in speciebus nonnullis nitentes in proximis, glabrae vel puberulentes circa *nodos* aetate florendi. *Folia* percomposita, inflorescentiae numerosa, *foliolis* subrotundis, apice plus minusve trilobatis vel grosse dentatis. *Pedunculi* longissimi et pendentes aetate fructuum maturandorum, brevissimi tamen aetate florendi. *Flores* perfecti, *carpellis* 1–4, *staminibus* purpureis antheris mucronatis. *Sepala* viridia (an semper?). *Stigmata* saepius truncata aetate fructuum maturandorum. *Fructus* plus minusve recurvatus vel fere rectus, plus minusve compressus vel, si sectus, rotundus, *nervis* rugosis, *T. impexo* nostro excepto, stipitatus, nec costatus. Species typica *Thalictrum cincinnatum* nostrum sit.

Height attributed herewith to the different species is based mainly on measurements of a few nearly complete individuals which have been folded until they fitted the Procrustean bed of an herbarium sheet. Collector's observations were available only in the case of *T. Mannii* Hutchinson and on two herbarium sheets, one of *T. innitens* nostrum and one of *T. Steinbachii* nostrum.

The underground system of all the species of this section is unknown. There seems to be no fixed flowering season for the African species, at least those from central Africa.

Clavis ad Florentia

a. Antherae 0.8–0.9 mm., sepala 1.3–2.0 mm. longa, filamenta 1.5–3.0 mm. longa....*b.*
b. Stigma 1.5–3.0 mm.....*c.*
c. Filamenta ca. 1.5 mm., sepala 1.3–1.5 mm. longa....30. *T. aduncum.*
c. Filamenta ca. 2.5 mm., sepala 1.5–2.0 mm. longa....32. *T. innitens.*
b. Stigma 4.0–5.0 mm.....31. *T. rhynchocarpum.*
a. Antherae 1.2–3.0 mm., sepala 1.2–6.0 mm. longa....*d.*
d. Carpella singula raro gemina in floribus singulis....*e.*
e. Sepala 2.0–3.0 mm. longa....*f.*
f. Filamenta ca. 8.0 mm.....37. *T. Steyermarkii.*
f. Filamenta 3.0–4.5 mm.....*g.*
g. Stylus una stigmate ca. 4.5 mm., stamina 13–19 in floribus singulis.....33. *T. Chapinii.*
g. Stylus una stigmate 2.0–4.0 mm., stamina 5–8 in floribus singulis.....34. *T. impexum.*
e. Sepala ca. 5.0 mm. longa.....35. *T. Stolzii.*
d. Carpella 2–4 in floribus singulis....*h.*
h. Sepala 1.8–3.5 mm. longa....*i.*
i. Stylus una stigmate 4–7 mm.....*j.*
j. Sepala 2.0–3.5 mm. longa.....33. *T. Chapinii.*
j. Sepala ca. 1.8 mm. longa.....36. *T. Steinbachii.*
i. Stylus una stigmate 8–13 mm.....*k.*
k. Stylus una cum stigmate ca. 13 mm.....37. *T. Steyermarkii.*
k. Stylus una stigmate 8–10 mm.....38. *T. cincinnatum.*
h. Sepala ca. 6 mm. longa.....39. *T. macrocarpum.*

Clavis ad Fructus ferentia

a. Carpella sessilia.....34. *T. impexum.*
a. Carpella stipitata....*b.*
b. Carpella solitaria, rarissime gemina....*c.*
c. Carpella compressa, ad tergi medias valde recurvata..30. *T. aduncum.*
c. Venter carpelli parum si vero recurvatum....*d.*
d. Carpella 3–4 mm. lata.....37. *T. Steyermarkii.*
d. Carpella 1.5–2.4 mm. lata....*e.*
e. Venter carpelli oblanceolatum, ad extremas parum recurvatum.....31. *T. rhynchocarpum.*
e. Ventrum carpelli lanceolatum vel ovato-lanceolatum....*f.*
f. Stylus una stigmate 3.5–4.5 mm.....32. *T. innitens.*
f. Stylus una stigmate 5.0–6.0 mm.....33. *T. Chapinii.*
b. Carpella nunc solitaria, nunc gemina, nunc ternata, in eadem planta....*g.*
g. Africanum, carpellis lanceolatis.....33. *T. Chapinii.*
g. Americana vel pyrenaicum, carpellis semiovatis vel ovatis....*h.*
h. Venter carpelli parum recurvatum 3–5 mm. longum. 36. *T. Steinbachii.*
h. Venter carpelli 5.0–7.5 mm. longum, nervo dorsali convexo vel recto, tamen ad medias parum concavo....*i.*
i. Pedunculi debiles recurvati, pendentes, nisi steriles. Plantae elatae. Inflorescentia copiose ramosa....*j.*
j. Stipes ca. 1 mm.....37. *T. Steyermarkii.*
j. Stipes 2.0–3.5 mm.....38. *T. cincinnatum.*
i. Pedunculi rigidi ascendentes. Plantae semimetrales. Inflorescentia simplex vel fere simplex....39. *T. macrocarpum.*

T. Stolzii Ulbrich being known only from flowering material has been, consequently, omitted from the second key.

As the fruit reaches maturity, the stigma is likely to break off somewhere along its length. The accompanying illustrations all represent such shortened stigmas, but unbroken ones are usually to be found on each herbarium sheet. Vegetative characters vary but little through the section, exception being made of *T. macrocarpum* Gren.

30. T. **aduncum,** sp. nov. *Planta* metralis vel paululum altior. *Folia* 5–6-ternata, *foliolis* parvis. *Pedunculi* ca. 10 cm., fructubus maturis. *Sepala* 1.3–1.5 mm. longa. *Stamina* 5–6. *Filamenta* ca. 1.5 mm. *Antherae* oblongae, 0.8–0.9 mm. longae, apice obtusae, breviter acuminatae. *Ovaria* solitaria. *Stylus* una stigmate 1.5–2.0 mm., aetate maturandi 4.5–6.0 mm. *Fructus* 13.5–15.5 mm. longus, compressus, ad medias valde recurvatus, *stipite* 2.5–3.0 mm., ventre ca. 7.0 mm. longo, ca. 2.5 mm. lato, *nervis* simplicibus.—Congo: *Humbert 7448*, montagnes à l'ouest du lac Kivu, forêt à l'W de Tshibinda, alt. 2000–2400 m., février-mars 1929 (G, type). Fig. 30, a–d.

31. T. rhynchocarpum Dill. & Rich., Ann. Sci. Nat. ser. 2, **14:** 262, 1841. *T. longepedunculatum* Hochst. & Steud. ex Steud. Nom. Bot. **2:** 676, 1841 ut synonymon, nec *Thalictrum longepedunculatum* Sennen, Bull. Soc. Bot. Fr. **73:** 642, 1926. *T. chymocarpum* Dill. ex Walp. Ann. Bot. Syst. **2:** 5, 1851. *T. Mannii* Hutchinson ex Hutchinson & Dalziel, Fl. W. Trop. Afr. **1:** 66, 1927.—*Planta* sesquimetralis usque bimetralis (an metralis usque ad quadrimetralis?). *Folia* ca. 5-ternata, *foliolis* 0.3–2.0 cm. diametro. *Sepala* 1.4–1.8 mm. longa. *Stamina* 5–10. *Antherae* ellipsoideae ca. 0.9 mm. *Filamenta* ca. 3.0 mm. *Stylus* una stigmate 4.0–5.0 mm., aetate maturandi 4.5–5.5 mm. *Carpella* matura 15.5–18.0 mm. longa, parum recurvata in apice *stipitis* 2.5–5.0 mm. et ad apicem ventris oblanceolati nec compressi 8–10 mm. longi et 1.5–1.8 mm. lati, *nervis* simplicibus.—Nigeria: according to Hutchinson, in the Cameroon Mts. and at Buea and Fernando Po (type locality of *T. Mannii*). Abyssinia: *Schimper 472*, Berg Semajata, 7300 f., July 14, 1862 (G); *Schimper 1137*, inter Endchedcap et Schoata, 1838–1842 (G); *Schimper 1183*, Gerra, 7800 ft. (F). Belgian Congo: *Linder 2116*, Mt. Ninagongo, 8000–9000 ft., Feb. 16, 1927 (G). Fig. 31, a–d.

The type of this species from Abyssinia, is presumably preserved at Paris and has not been seen, but the description is clear enough and, the species being the only one found in the mountains of Abyssinia, there is no doubt about its interpretation. The illustration in A. Richard Tent. Fl. Abyss., tabula 2, confirms this interpretation. On the herbarium sheet of *Schim-*

per 1137, there is the following manuscript note: "*Thalictrum rhynchocarpum. Ach. Rich. in Ann. sc. nat., Bot., XIV (1840) p. 262 (publ. le 24 Mars 1841)*".

Thalictrum longepedunculatum Hochst & Steud. was not given a new description when published, it was simply a new name for *T. rhynchocarpum* Dill. & Rich.

T. chymocarpum Dill. is probably an error of spelling or printing.

T. Mannii Hutchinson. Described from flowering specimens from Nigeria, a region from which I have not seen any *Thalictrum*. The characters stressed by the describer seem to fall within the range of variation of *T. rhynchocarpum* Dill. & Rich. The stamens and the fruit, however, are too briefly described to enable one to form a definite opinion about the status of this species. As described by Hutchinson, it is a plant 1 to 4 meters high. As far as records go, this is the tallest plant in the whole genus.

32. T. **innitens,** sp. nov. *Planta* ca. 1.5 metrorum. *Folia* usque ad septies ternata. *Pedicelli* ca. 10 cm. aetate fructuum maturandorum. *Sepala* 1.5–2.0 mm. longa. *Stamina* 5–6. *Antherae* ovoideae breviter mucronatae, ca. 0.8 mm. *Filamenta* ca. 2.5 mm. *Ovaria* solitaria, *stigmate* 2.0–3.0 mm. usque ad 4.5 mm. accedente cum carpella maturant. *Fructus* compressus rectus vel parum recurvatus 10–14 mm. longus, *stipite* 1.5–2.0 mm., *ventre* ovoideo-lanceolato 6.5–7.5 mm. longo, 2.0–2.4 mm. lato, *nervis* arcuantibus simplicibus.—Nyassa: *Buchanan 64*, 1891 (US); *Stolz 148*, Station Kyimbila, Bundali Gebirge, 1300–1500 Meter Seehöhe, Nov. 25, 1907 (G, US). Rhodesia: *Swynnerton 352*, Chipete forest-patch, a climber common on forest outskirts, alt. 3800 ft., 1906 (US). Transvaal: *Drakensberg*, Pilgrim's Rest (F 69,381). Orange: *Cooper 1038*, in woods, 1862 (NY). Natal: *Wylie* (*J. M. Wood's* no. 8128), Wahawag Mtn., alt. 6–7000 ped., March 22, 1901 (US). Cape: *Murray 598*, in densis sylvis "Kabousie", alt. 3500 ft., flor. dec. (G, type; F, isotype). Fig. 32, a–d.

It is doubtful whether this plant really is a climber. The herbarium specimens show no evidence to that effect. The stem is hollow, thin and rather easily crushed and seems an inappropriate support for a plant of this size. The large and abundantly branched inflorescence with its pendulous fruits is likely to become more or less entangled in the branches of adjoining shrubs, thus giving the plant the additional support needed.

This undoubtedly holds true for most of the species of the § Cincinneria, especially the tallest ones.

33. T. **Chapinii,** sp. nov. *Planta* circa sesquimetralis. *Folia* usque ad quinquies ternata. *Pedicelli* 5–10 mm. *Sepala* 2.0–3.5 mm. longa. *Stamina* 13–19. *Antherae* oblongo-lanceolatae 1.4–2.1 mm., *mucrone* 0.2–0.7 mm. *Filamenta* 3.2–4.5 mm. *Ovaria* nunc singula nunc gemina, nunc ternata. *Stigma,* aetate fructus maturandi, 5.0–6.0 mm. *Carpella* matura parum recurvata compressaque, 13.0–14.5 mm. longa, *stipite* 1.5 mm., ventre ca. 6.5 mm. longo, ca. 2.0 mm. lato, *nervis* arcuantibus simplicibusque.—Congo: *Chapin 386,* slope of Mt. Karisimbi, Kivu district, alt. 11,000 ft., rather common about Kabara, about same level, June 19, 1927 (NY, type); *J. P. Chapin 518,* Kivu district, mts. s. w. of Lemera, lower Ruzizi Valley, alt. 9600 ft., July 17, 1927 (NY). Kenya: *Mearns 1350* & *1414,* western slopes of Mount Kenia, along the trail from West Kenia Forest Station to summit, in the "giant heath" zone, at about 3630 meters, Sept. 21–27, 1909 (1350:US; 1414:NY, US); *Mearns 1670* & *2320,* western slopes of Mount Kenia, along the trail from West Kenia Forest Station to summit, bamboo zone, at about 3000 meters, Sept. 28–Oct. 7, 1909 (1670: F, US; 2320: US). Fig. 33, a–d.

Although flowering material of *T. Chapinii* and *T. innitens* is distinguished easily indeed, these species become more or less confluent as they mature their fruits.

34. T. **impexum,** sp. nov. *Planta* verosimiliter circa bimetralis. *Folia* ternata usque ad sexies. *Pedunculi* 5–9 cm. *Sepala* 2.0–2.4 mm. longa. *Stamina* 5–8 in floribus singulis. *Antherae* oblongo-lanceolatae. *Ovaria* singula rarius gemina, *stigmate* 2.0–4.0 mm., aetate maturandi, 4.0–5.0 mm. longo, 1.1–1.3 mm. lato, *pariete* membranaceo, *nervis* simplicibus parumque arcuantibus.—Congo: *Chapin 143,* Kalongi, Batahu Valley, West Ruwenzori, alt. 6900 ft., Dec. 29, 1926 (NY); *Chapin 188,* Kalongi, West Ruwenzori, common hereabout, fl. dull dark purplish tinged with green, alt. 6950 ft., Jan. 8, 1927 (NY). Kenya: *A. G. Curtis 817,* Mau range, a forest valley, leaves apple-green, alt. 5000 to 7000 ft., July 26, 1923 (G); idem *839,* flower brownish, leaf dark cress-green, July 27 (G); idem *850,* leaves parrot-green, July 27 (G); *Mearns 595* & *630,* between the Naiok River and Lake Naivasha, alt. 1800–2100 m., July 9–12, 1909 (595: US; 630: US, 630, 652, type: US 630, 653 isotype). Fig. 34, a–d.

This species is peculiar for this section because of its nearly sessile fruit. When in flower it closely recsembles *T. Chapinii* which occupies about the same range at higher altitudes.

35. T. Stolzii Ulbrich, Notizbl. Berl. Gart. **10:** 916, 1930. Herba perennis erecta ad 1.25–1.50 m. alta parce ramosa *caule* basi 7–8 mm. crasso, omnino glaberrimo fusco-violaceo. *Folia* caulina in vaginam fere 35 mm. longam 15–20 mm. latam dilatato, usque ad laminae ramificationem ± 12 cm. longo glaberrimo; lamina 3–4-pinnata *foliolis* ± 3 mm. petiolulatis circuitu orbicularibus vel reniformibus margine grosse crenatis crenis subapiculatis, 10–12 mm. longis, 10–15 mm. latis, glaberrimis, supra atroviridibus, subtus glaucescentibus, nervis reticulatis supra inconspicuis, subtus prominentibus. *Inflorescentia* satis parva decomposita contracta paniculata. *Flores* satis magni lilacei *pedicello* brevissimo, 2–4 mm. longo, glaberrimo instructi patentes, basi *bractea* lineari-lanceolata ± 4 mm. longa membranacea, 0.5–1 mm. lata glaberrima lilacea munita; *sepala* ovalia vel late-ovalia ± 5 mm. longa, ± 3 mm. lata, obtusa, glaberrima ± quinquenervia. *Stamina* ± 8 mm. longa *filamentis* filiformibus tenerrimis glaberrimis superne vix dilatatis sparsis (5–10), *anthera* lineari-oblonga 1–1.5 mm. longa. *Ovaria* (plerumque in flore unicum, rarius 2) brevissime stipitata vel subsessilia glaberrima anguste lineari-lanceolata cum stylo ± 5 mm. longa in stylum fere 3 mm. longum rectum sensim attenuata; *stigma* apice lateraliter decurrens fere 1 mm. longum. Fructus ignotus.—"*Ostafrika*: Nyassa-Hochland Kyimbila im Bambuswalde bei Bulongwa, ca. 2100 m ü. d. M. (blühend 17. September 1913—Ad. Stolz n. 2175!)."

"Die Art steht in der Fruchtbildung augenscheinlich *Th. rhynchocarpum* Dill. und Rich. nahe, das gleichfalls nur wenige bis 1 Fruchtblatt . . . hat aber einen sehr lockeren, sparrig verzweigten Blütenstand und sehr kleine grüne Blüten. *Th. Stolzii* ist leicht kenntlich an den grossen rötlichen oder lila Blüten in einem (im vorliegenden Material) dicht zusammengezogenen Blütenstande. Leider liegen keine bis zur Fruchtreife entwickelten Pflanzen vor; es ist jedoch anzunehmen, dass sich der Blütenstand später in vielleicht ähnlicher Weise wie bei *Th. rhynchocarpum* streckt.

"Es ist auffällig, dass unter dem sehr reichhaltigen Material, welches das Botanische Museum in Berlin-Dahlem aus dem tropischen Afrika erhielt, diese Art bisher nicht vertreten war; sie scheint demnach selten und bisher übersehen zu sein.

"Anmerkung: Im gleichen Gebiete: Kyimbila, Mkinga, Mwakalila, Bergwiese in 2000 m ü. d. M. sammelte Ad. Stolz (8. Januar 1914 n. 2421!) eine Pflanze, die wohl gleichfalls hierher zu stellen ist. Diese ist nur etwa 40 cm hoch, unverzweigt mit

kleinen Blättern und meergrünen Blättchen mit meist dreilappiger Spreite. Die Blüten (es liegen nur Knospen vor) sind gleichfalls sehr gross und nach Angabe des Sammlers weiss, aussen rosa. Es handelt sich vermutlich nur um eine Lichtform von *Th. Stolzii*, doch ist das Material leider zu spärlich, um eine sichere Bestimmung zu ermöglichen."

The preceding text is a copy of the original description and comments.

No material has been seen which could be ascribed to this species; however the characters of the flowers contrast strongly with all other species of this section. Ulbrich's description of the inflorescence of *T. Stolzii* applies equally well to the flowering stage of any species of this group. Similarly his description of the inflorescence of *T. rhynchocarpum* Dill. & Rich. characterizes all fruiting material belonging to the § Cincinneria. The leaves are described as "*pinnata*," but this we much doubt. If true indeed, there should be no trouble at all to recognize the species at any stage of its life-cycle. The fruits are not described and it is difficult to guess what they look like. The only material at hand from Nyassa (*Stolz 148*, 25 Dez., 1907), bears immature fruits strongly suggesting those of *T. innitens* but they are somewhat narrower. This latter specimen is cited under *T. innitens*.

36. T. **Steinbachii,** sp. nov. *Planta* ca. 3 m. alta. *Pedicelli* 5–10 cm. *Sepala* ca. 1.8 mm. longa, *Ovaria* nervosa pauca, 2–4 in flore. *Stylus* una stigmate 4–7 mm. *Carpella* matura recurvata semi-ovata, 6.0–8.5 mm. longa, *stipite* 1.5–2.0 mm., ventre 3.0–5.0 mm. longo, 1.5–2.0 mm. lato, *nervo* dorsali concavo. Floret verosimiliter Decembri.—Bolivia: *Steinbach 8869*, Incachaca, Prov. Chapare, Depart. Cochabamba, Feuchte Böschung, Meereshöhe 2200 m., Jan. 21, 1929 (G, type and isotype; F, NY, ANS, isotypes). Fig. 36, a–c.

One specimen bears the following note: *ca 3 M. Ranksustande.* This plant is probably no more of a climber than *T. innitens* but, just as does the latter, probably gains additional support when its inflorescence gets entangled in the surrounding vegetation.

37. T. Steyermarkii Standley, Field Mus. Nat. Hist. Bot. **22:** 230, 1940. *Planta* 1.0–2.5 metrorum, glabra nisi in carpellis. *Folia* nonnunquam metralia, ad septies ternata, saepius conspicue stipellulata. *Pedicelli* ca. 5 cm. *Sepala* elliptica purpurascentia ca. 3 mm. longa. *Filamenta* ca. 8 mm. *Antherae* oblongo-lanceolatae ca. 3 mm., acumine 0.2–0.6 mm. *Stylus*

una cum stigmate ca. 13 mm. *Carpella* matura firma 9–12 mm. longa, cinerea, pubescentia. *Pubescentia* pilorum translucidorum rectorum densorum arachnoideorum. Si pubescentia tactu deleta est, carpella purpurascentia revelantur. *Nervi* fructuum in costis sublati, plus minusve ramosi et anastomosi, minute ad summas sinuosi et nonnunquam gibbosi, nervus ventralis convexior et semper gibbosus, dorsalis rectus esset nisi ad medias parum concavitas. *Stipes* fructus ca. 1 mm., venter 5.5–6.5 mm. longus et 3.0–4.0 mm. latus, rostrum 2.5–4.0 mm. directum, paries 0.3–0.5 mm. crassitudinalis. Verosimiliter floret Novembri. GUATEMALA, SAN MARCOS: *Steyermark 36,575*, northwestern slopes of Volcán Tajumulco, barrancos south and west of town of Tajumulco, moist slopes around seepage at base of barranco, herbaceous, 8 ft. tall, leaves blue-green above, grass-green beneath, follicles glaucous-green, alt. 2300–2500 m., Feb. 25, 1940 (F, TYPE, mounted on two sheets); *Standley 68,465*, above San Rafael Pie de la Cuesta, Barranco Eminencia, wet meadow, common, alt. 2100–2400 m., March 14–15, 1939 (F, paratype); *Steyermark 36,483*, near southeast portion of Volcán Tacaná, between Canjula and La Unión Juárez, herb 5 ft. tall, leaves membranaceous, grass-green above, silvery-green beneath, Feb. 22, 1940 (F, paratypes); *Steyermark 36,989*, lower to middle slopes of Volcán Tajumulco, between Todos Santos and Finca El Provenir, slopes around quebrada, alt. 1300–3000 m., March 1, 1940 (F, paratype); *Steyermark 36,191*, between La Vega ridge along Rio Vega and northeast slopes of Volcán Tacaná, to 3 miles from Guatemala-Mexico boundary, in vicinity of San Rafael, shaded banks of slopes bordering escarpment of stream, herb 5 ft. tall, alt. 2500–3000 m., Feb. 20, 1940 (F, paratype). QUEZALTENANGO: *Standley 83,523*, south of San Martín Chile Verde, region of Las Nubes, damp densely forested barranco, herb 2 m. tall, alt. about 2250 m., Jan. 16, 1941 (F); *Standley 85,131*, South of San Martín Chile Verde, region of Las Nubes, on white sand mountain side, damp thicket, herb 1.5 m. tall, alt. about 2250 m., Jan. 27, 1941 (F); *Standley 85,680*, between San Martín Chile Verde and Colombo, above Mujuliá, in damp dense mixed forest on white sand slopes, herb 1.5 m. tall, alt. about 1800 m., Feb. 1, 1941 (F); *Standley 83,652*, south of San Martín Chile Verde, region of Las Nubes, densely forested barranco, herb 1.5 m. tall, alt. about 2250 m., Jan. 16, 1941 (F); *Standley 85,140*, south of San Martín Chile Verde, region of Las Nubes, damp thicket, herb 1 m. tall, Jan. 27, 1941 (F). FIG. 37, a and b.

38. T. **cincinnatum,** sp. nov. *Planta* verosimiliter ca. 3 metrorum vel altior. *Pedicelli* 13–17 cm. *Antherae* oblongo-lanceolatae, ca. 2.5 mm. *Ovaria* 2–3 in flore. *Carpella* matura compressa, 9–13 mm. longa, stigmate 8–10 mm., *stipite* 2.0–3.5,

ventre 5.0–7.5 mm. longo, 2.5–3.0 mm. lato, *nervis* parum ramosis et parum anastomosis nervo dorsali fere recto nisi esset ad medias parum concavus. Tempus florendi ignotum verosimiliter vernale.—BOLIVIA: *Steinbach 9231*, Incachaca, Prov. Chapare, Dept. Cochabamba, Wald Meereshöhe 2300 m., Febr. 18, 1929 (G, TYPE; ANS, F, NY, ISOTYPES). FIG. 38, a and b.

Judging from the herbarium fragments, this species is probably as high if not higher than *T. Steinbachii* or even than *T. rhynchocarpum* Dill. & Rich. (*T. Mannii* Hutchinson).

39. T. MACROCARPUM Grenier, Séances Publ. Acad. Sci. Besançon 117. 1838. *T. majus* Gren. Act. Soc. Linn. Bordeaux, **8:** 2, 1836, nec *T. majus* Crantz, Stirp. Austr. **2:** 80, 1763, nec *T. majus* Jacq. Fl. Aust. **5:** t. 420, 1788, nec *T. majus* Tenore, Syll. Pl. Vasc. Fl. Neap. 265, 1831, nec *T. majus* Dunn, Ind. Sem. Hort. Panorm. 32, 1880.—*Planta* omnino glabra semimetralis. *Folia* inferiora 1–3 in planta, 4-ternata. *Folia* caulinaria desunt. *Folia* inflorescentiae inferioris 3-ternata *foliolis* 3–5-lobatis. *Folia* inflorescentiae superioris ovata integra. *Stipulae* et *stipellulae* desunt. *Inflorescentia* simplex vel, si ad basem ramosa, ramis bi-tri-floriferis foliumque solitarium ferentibus. *Pedunculi* 5–10 cm., aetate fructuum maturandorum. *Flores* lutei. *Sepala* elliptica 5–6 mm. longa. *Antherae* ca. 3 mm., *acumine* 1.0–1.5 mm. *Ovaria* 2–4 in flore. *Stigma* 8–9 mm., in primis rectum vel recurvatum, deinde incurvatum, alis ca. 0.5 mm. lat. *Carpella* matura valde compressa, *stipite* 0.5–2.0 mm., ventre 8.5–10.0 mm. longo et 3–4 mm. lato, *nervo* dorsali fere recto vel parum convexo, ventrali multo quam dorsali convexiore, nervis lateralibus conspicue ramosis et anastomosis. Floret Julio et Augusto.—FRANCE: *Cosson*, Basses Pyrénées, prope Eaux-Bonnes, in monte, montagne de Gourzi, 7 augusti, 1847 (G); *Forestier*, près les Eaux-Bonnes, pic d'Anis, 5 août, 1841 (G); *Philippe*, Basses Pyrénées, col de Tortes, août, 1847 (G). FIG. 39.

Sectio CAMPTOGASTRUM Prantl, Nat. Pfl. **3,** 2: 66, 1888. *Radix* fibrosa. *Folia* saepe stipellulata. *Foliolae* haud peltatae. *Pedicelli* sub fructum recurvatum. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi, raro perfecti omnes. Masculi nonnulli ad anthesim veniunt cum carpella perfectorum maturant. *Antherae* oblongae lanceolatae vel lineares, plus minusve acuminatae. *Filamenta* purpurascentia nec clavata. *Ovaria* sessilia vel stipitata, saepius, si adsunt, 4–10 in floribus singulis. *Stigmata* filiformia, nec alata. *Carpella* matura plus minusve compressa, nonnunquam stipitata, *nervis* plus minusve ramosis, saepe et anastomosantibus et sinuosis et gibbosis. Species typica *Thalictrum gibbosum* Lec. sit.

Some of the species are described in the text as having all

flowers perfect, but this is a point still imperfectly known, for when the ovaries start enlarging the plant still goes on blooming but these later flowers are always staminate. This stage seems not to be represented for all species of this section. However, *T. Venturii* and *T. inuncans* are definitely known as always having perfect flowers.

The following key is based mainly on pubescence, notwithstanding the fact that the fruit has furnished the main characters on which to base each of the successive species. Only about one third of the herbarium specimens having mature fruits, and the flowers not being very much varied, it is not possible to build up a natural key which would be a satisfactory tool with which to identify herbarium material. Although this key is artificial it is still not possible to identify all flowering specimens, but it has been found that by comparing such flowering plants with only those species known to occur in the region of the plant to be named, it was usually possible to arrive at a satisfactory identification. This is why distribution-data have been given in the key.

a. Ovaria 18–36 in flore. In Argentina.....71. *T. Venturii.*
a. Ovaria 0–10 in flore....*b.*
b. Pubescentia diversa, aliqui pilorum acicullariformes compressi triangulares et paullulum recurvati. Staminum filamenta 15–17 mm. In Bolivia.....40. *T. inuncans.*
b. Pili acicullariformes et recurvati desunt. Staminum filamenta breviora....*c.*
c. Planta nana 20–50 cm. alta, foliis imis plurimis, folium caulinarium vel solitarium vel deest, folia inflorescentiae vel 1–3, vel desunt. Foliolae parvae, 3–10 mm. longae. In Hidalgo.....50. *T. pachuense.*
c. Folia caulinaria plura....*d.*
d. Foliolae cordatae, dentatae, acuminatae. Pubescentia e pilis stellatis stipitatis. In Guatemala.....51. *T. Standleyi.*
d. Foliolae apice trilobatae vel grosse dentatae, nec acuminatae. Pubescentia vel e pilis simplicibus vel deest....*e.*
e. Foliolae inferne glabrae....*f.*
f. Stylus una cum stigmate 2–4 (–5) mm.....*g.*
g. Filamenta 3–5 mm. Carpella matura 2.7–3.5 mm. longa....*h.*
h. Filamenta 4–5 mm. Carpella matura ca. 3.5 mm. longa, nervis simplicibus nec ramosis. In Vera Cruz.....41. *T. Galeottii.*
h. Filamenta ca. 3 mm. Carpella matura 2.7–3.0 mm. longa, nervis ramosis et anastomosantibus, nervo ventrali gibboso. In Sonora 55. *T. parvifructum.*
g. Filamenta 6–10 mm. Carpella matura 6–9 mm. longa....*i.*

i. Antherae apice truncatae, vel acumine 0.1–0.2 mm. Carpella matura gibbosa. In Guatemala.....52. *T. Johnstonii.*
i. Antherae acumine 0.5–1.0 mm. Carpella matura non gibbosa. In Peruvia, Bolivia, et Argentina.....43. *T. decipiens.*
f. Stylus una stigmate (4–) 5–15 mm.....*j.*
j. Carpella matura nervo ventrali nullo modo gibboso.....*k.*
k. Nervis lateralibus parum ramosis, nec sinuosis, nec anastomosantibus.....*l.*
l. Stylus una stigmate 4–10 mm.....*m.*
m. Carpella matura 4.5–5.5 mm. longa. In Mexico et Costa Rica.....42. *T. Hintonii.*
m. Carpella matura 6.5 mm. vel longiora.....*n.*
n. Carpella 2–3 mm. lata nervo dorsali convexo vel fere recto. Stigma 4–8 mm. Planta nonnunquam glauca. In Peruvia, Bolivia et Argentina. 43. *T. decipiens.*
n. Carpella 3.0–3.2 mm. lata, nervo dorsali basi concavo. Stigma 8–10 mm. longum. Planta nullo modo glauca. In Panama.....44. *T. viridulum.*
l. Stylus una stigmate 10–15 mm. In Peruvia.....46. *T. Macbrideanum.*
k. Nervis lateralibus ramosis et anastomosantibus, saepe sinuosis.....*o.*
o. Stipes ovarii 0.5–1.5 mm. Carpella matura 9–10.5 mm. longa. In Venezuela, Colombia et Ecuador.....70. *T. podocarpum.*
o. Stipes ovarii 0–0.5 mm. Carpella matura 4.5–8.0 mm. longa.....*p.*
p. Carpella matura 6.5–8.0 mm. longa. In Tamaulipas, Nuevo León et San Luis Potosí.....47. *T. Deamii.*
p. Carpella matura 4.5–5.5 mm. longa.....*q.*
q. Folia caulinaria conspicue petiolata. Planta glauca. In Chihuahua, Durango, Nuevo León et San Luis Potosí.....48. *T. grandifolium.*
q. Folia caulinaria sessilia in apice dilatationis petiolaris. Planta nullo modo glauca. In Guerrero.....49. *T. Hernandezii.*
j. Carpella matura nervo ventrali gibboso, lateralibus saepius gibbosis. Gibbositas patet nonunquam in ovario, saepius tamen in carpellis immaturis.....*r.*
r. Carpella matura 2.7–3.0 mm. longa. Planta semimetralis vel minor. In Sonora 54. *T. parvifructum.*
r. Carpella matura 4.0–10.5 mm. longa.....*s.*
s. Carpella matura 4–8 mm. longa.....*t.*
t. Carpella matura 4–6.5 mm. longa.....*u.*
u. Petioluli divaricati vel refracti parum incurvati. Foliolae basi cordatae. Carpella matura 6.0–6.5 mm. longa, 3.0–3.2 mm. lata, stipite 0.5–1.0 mm. Stipes ovarii 0–0.5 mm. In Colombia.....63. *T. refractum.*

u. Petioluli plus minusve ascendentes. Sepala 2–5 mm. longa. . . . *v.*
v. Carpella matura 4–6 mm. longa, 1.8–2.0 mm. lata, stipite 1–3 mm. Sepala 2.5–3.5 mm. longa. Stipes ovarii 0.5–1.0 mm. In Baja California. . . . . 64. *T. peninsulare.*
v. Carpella matura 4–8 mm. longa, 2–3 mm. lata, stipite 0.5–2 mm. Sepala 3–5 mm. longa. Stipes ovarii 0.2–0.5 mm. longus. In Vera Cruz, Hidalgo, Mexico, Puebla, Morelos et Oaxaca. . . . . 65. *T. gibbosum.*
t. Carpella matura 7–8 mm. longa. . . . *w.*
w. Carpella matura saepius apice acuta, 7–8 mm. longa, 2–3 mm. lata, stipite 0.5–2.0 mm. Sepala 3–5 mm. longa. Stipes ovarii 0.2–0.5 mm. longus. In Vera Cruz, Hidalgo, Mexico, Puebla, Morelos et Oaxaca. . . . 65. *T. gibbosum*
w. Carpella matura saepius apice obtuso, 7–7.5 mm. longa, ca. 3.3 mm. lata, stipite 1.0–2.5 mm. Sepala 5–6.5 mm. Stipes ovarii 0.5–1.5 mm. In Ecuador. . . . . 68. *T. vesiculosum.*
s. Carpella matura 9.0–10.5 mm. longa. In Colombia, Venezuela et Ecuador. 70. *T. podocarpum.*
e. Foliolae inferne plus minusve pubescentes. . . . *x.*
x. Pubescentia caulinaria e pilis opacis undulatis, acuminatis 1–4 millimetralibus. Foliolae inferne sparse pubescentes. In Oaxaca et Puebla. . . . . 53. *T. lanatum.*
x. Pubescentia caulinaria e pilis millimetralibus vel brevioribus vel deest. . . . *y.*
y. Pubescentia foliorum paginae inferioris e pilis omnibus capitatis. . . . *z.*
z. Planta omnino pubescens carpellis maturis ca. 6.5 mm. longis, 2.0–2.2 mm. latis. In Panama. . . . . 45. *T. panamense.*
z. Foliolae superne glabrae. . . . α.
α. Pili caulinarii et rameales uniseriati et translucidi. Carpella matura ca. 3 mm. longa. In Durango. . . . . 54. *T. Pennellii.*
α. Pili omnes capitati et translucidi. Carpella matura 4.0–5.5 mm. longa. . . . β.
β. Sepala viridia ca. 3 mm. longa. Carpella matura ca. 5.5 mm. longa, ca. 3.8 mm. lata. In Coahuila. . . . . 57. *T. laeteviride.*
β. Sepala colorata 3.8–4.5 mm. longa. Carpella matura 4–5 mm. longa, 2.3–2.9 mm. lata. In Mexico. . 59. *T. subpubescens.*
y. Pubescentia e pilis vel uniseriatis translucidis, vel opacis crassiusculis coloratis vel aliis capitatis, aliis opacis crassiusculis coloratis. . . . γ.
γ. Pubescentia e pilis omnibus uniseriatis translucidis densisque. . . . δ.
δ. Carpella glabra. In Vera Cruz, Mexico, Distrito Federal et Oaxaca. . . . . 61. *T. Conzattii.*
δ. Carpella plus minusve pubescentia. . . . ε.

ε. Folia caulinaria conspicue petiolata. Carpella matura 3.3–5.0 mm. longa. In Jalisco, Hidalgo et Michoacán. 60. *T. pubigerum.*

ε. Folia caulinaria sessilia vel fere sessilia in apice dilatationis petiolaris. Carpella matura 5–6 mm. longa. In Mexico, Michoacán et Puebla. 62. *T. sessilifolium.*

γ. Pubescentia e pilis omnibus crassiusculis opacis coloratis, vel aliis crassiusculis coloratis opacis obtusis interdum acuminatis....ζ.

ζ. Carpella matura 2.7–3.0 mm. longa. Stylus una stigmate 3–5 mm. Planta semimetralis vel brevior. In Sonora. 55. *T. parvifructum.*

ζ. Carpella matura 3.5–8.0 mm. longa....η.

η. Foliolae inferne densissime pubescentes....θ.

θ. Carpella matura 3.5–4.5 mm. longa. In San Luis Potosí, Zacatecas, Vera Cruz, Hidalgo, Mexico, Distrito Federal et Michoacán.....56. *T. strigillosum.*

θ. Carpella matura 7–8 mm. longa. In Oaxaca.....69. *T. Nelsonii.*

η. Foliolae inferne sparse pubescentes....ι.

ι. Stigma 8–10 mm. In Peruvia..66. *T. longistylum.*

ι. Stigma brevius....κ.

κ. Carpella matura 5–6.5 mm. longa. In Peruvia....λ.

λ. Carpella matura stipite 0.5–1.0 mm.....58. *T. lasiostylum.*

λ. Carpella matura stipite ca. 2 mm 67. *T. rutidocarpum.*

κ. Carpella matura 7–8 mm. longa. In Oaxaca.....69. *T. Nelsonii.*

This section is restricted to the mountains of Mexico, Central America and South America. In general, the species are based on the different types of fruits, for the flowers offer but few specific characteristics. However, two species, *T. gibbosum* Lec. and *T. decipiens* nostrum, show a high degree of variation in their fruits and they are pretty hard to characterize. A key to the flowering specimens would leave about 8 or 10 species, all glabrous, which could not be otherwise separated were it not for the fact that their ranges do not overlap in general. The interpretation of the different names already published is based on types or isotypes or syntypes or photographs of types or fragments of types. Only in two cases, *T. Hernandezii* Tausch and *T. lasiostylum* Presl, was it necessary to form an opinion on the original description only. Lecoyer did not have the opportunity of studying the types of those two species and considered them as synonyms.

Subsectio SIMPLICIA, subsect. nov. *Plantae* glabrae, *Thalictro inuncante* nostro excepto. *Ovaria* 10 vel pauciora in flore. *Carpella* matura compressa *nervis* simplicibus vel parum ramosis anastomosantibus et reticulatis, nec gibbosis, raro sinuosis.

40. T. **inuncans,** sp. nov. *Planta* verosimiliter 1.5–2.0 m. alta. *Pubescentia* caulis ramorum petiolorum petiolulorumque densa e pilis aliis capitatis translucidis, aliis crassiusculis triangularibus compressis recurvatisque. *Foliolae* superne glabrae, inferne puberulentes pilis capitatis translucidis vestitae. *Flores* perfecti (!) glabri. *Sepala* ovata ca. 5 mm. longa. *Antherae* nonnunquam falcatae ca. 4 mm., vel apice truncatae, vel obtusae cum acumine 0.1–0.2 mm. *Filamenta* 15–17 mm., conspicue purpurascentia. *Stylus* una cum stigmate 6–11 mm. *Stigma* paullo et regulariter a basi incrassatum. *Fructus* mihi ignotus. Floret Decembri.—BOLIVIA, TARIJA: *Fiebrig 2440,* Tecumilla bei Tarija, alt. 2000 m., Dez. 20, 1903 (G, TYPE and ISOTYPE: US, ISOTYPE). FIG. 40, a–c.

Although known only from one collection and at flowering time, this species should be easily recognized by its dense covering of very small recurved prickles, the only such case known to me in this genus. The filaments of the stamens are also longer than in any other species of *Thalictrum.* This species shows some relationship with *T. Venturii,* but its position is dubious. Both of these species have perfact flowers, obtuse or truncate anthers and somewhat clavate stigmas.

41. T. GALEOTTII Lecoyer, Bull. Soc. Bot. Belg. **24:** 121, 1885. *Planta* omnino glabra altitudinis ignotae, verosimiliter metralis vel brevior. *Flores* forsan omnes perfecti. *Sepala* 3.5–4 mm. longa. *Antherae* 1.2–2.0 mm., oblongo-lanceolatae, in apice truncatae, vel acumine 0.1 mm. *Filamenta* 4–5 mm. *Stylus* una cum stigmate 3–4 mm. *Carpella* matura subsessilia vel sessilia, ca. 3.5 mm. longa, ca. 1.5 mm. lata, *nervis* lateralibus parum ramosis nec undulatis nec gibbosis, nervo dorsali fere recto, ventrali convexo. Tempus florendi ignotum.—MEXICO, VERA CRUZ: *Galeotti 4541,* pic d'Orizaba, fl. blanches, alt. 10,000 p., juin–oct., 1842 (syntype at the Conservatoire Botanique de Genève; F, photograph of this syntype; G, syntype). FIG. 41, a–c.

Naturally, I have not seen the syntype in Switzerland, but I cannot find anything which matches either the photograph or the syntype at hand. The other syntype is no. 4570 from Xalapa by the same collector. Judging from Lecoyer's drawing, which naturally was made from one of those syntypes, and the photo-

graph at hand, the fruit resembles pretty much that of what we are calling *T. Hernandezii* Tausch, but it is much smaller. The anthers and stigmas also rank amongst the smallest in that section of the genus.

42. T. **Hintonii,** sp. nov. *Planta* omnino glabra 40–120 cm., *radicibus* fibrosis. *Stipulae* parum dilatatae. *Foliolae* fere orbiculares, basi cordatae, apice trilobatae, lobis rotundis mucronulatis, nonnunquam figura *Hepaticae americanae,* variabiles tamen. *Inflorescentia* 1–3 dm. longa, plus minusve secunda, *pedunculis* vel rectis vel parum recurvatis. *Flores* non satis notae, *sepalis* tamen ca. 4.5 mm. longis, *antheris* ca. 5 mm., *acuminibus* ca. 1.0 mm. *Carpella* matura fere orbicularia vel semi-ovata, 4.5–5.5 mm. longa, *stipite* 0.1 mm., ventre ca. 4 mm. longo 2.0–3.2 mm. lato, *nervis* parum ramosis nec gibbosis, nervo dorsali recto vel vario modo convexo, ventrali convexiore quam dorsali. Floret tempore mihi ignoto.—MEXICO, MEXICO: *Hinton 6743,* Temascaltepec district, Acatitlán, in the water, Oct. 12, 1934 (US, TYPE; F, G, M, NY, ISOTYPES). GUATEMALA, QUEZALTENANGO: *Standley 67,837,* southwest of San Martín, Chile Verde, Cumbre de Tuilacán, sandy Alnus forest, alt. about 2400 m., March 8, 1939 (F). COSTA RICA: *Standley 35,247,* near the Finca del Volcán de Turrialba, southern slope of Volcán de Turrialba, wet thicket, herb 3–4 ft., alt. about 2000 to 2400 m., Feb. 22, 1924 (US). FIG. 42.

Dedicated to the late G. B. HINTON whose abundant and well prepared Mexican specimens form a large proportion of and are among the best of the material at hand.

43. T. **decipiens,** sp. nov. *Planta* omnino glabra, 4–15 dm., plus minusve glauca, *radice* forsan tuberosa et solitaria. *Inflorescentia* saepius foliosissima. *Pedunculi* sub fructum recurvati. *Sepala* 3–7 mm. longa, elliptica vel orbicularia. *Filamenta* 6–10 mm. *Antherae* 2.5–5.0 mm., *acumine* 0.5–1.0 mm. *Stylus* una cum stigmate 4–8 mm. *Carpella* matura obovata vel semiobovata, 6–9 mm. longa, *stipite* 0.5–1.5, ventre 3.5–6.5 mm. longo, 2–3 mm. lato, *nervis* vel simplicibus vel ramosis anastomosantibusque nec gibbosis, nervo dorsali fere recto vel plus minusve convexo, ventrali convexiore quam dorsali, *rostro* nonnunquam recto saepius tamen ad tergum deflexo. In Peruvia floret a Novembri ad Januarium, in Bolivia Novembri et Decembri et in Argentina a Septembri ad Decembrem.—PERU: *Soukup 140* (F); *Ball,* ex saxosis Andium, juxta pagum Chicla, 12–13,000 p. s. m., apr. 21–23, 1882 (NY). JUNIN: *Killip & Smith 22,125,* near Huancayo, open rocky hillside, herb to 5 ft., alt. 3300–3500 m., Apr. 26, 27, May, 25, 1929 (F, NY, US); *Kalenborn 94,* vicinity of Oroya, among rocks, alt. 10–17,000 ft., 1918–1919

(M, NY, US). LIMA: *Killip & Smith 21,753*, Rio Blanco, open hillside, herb 2–4 ft., alt. 3000–3500 m., Apr. 15–17, 1929 (NY, US); idem *21,752*, herb 1–2 ft. (F, NY, US). PAUCARTAMBO: *Herrera 1047a*, Hacienda Churu, alt. 3500 m., Jan., 1926 (US, TYPE; F, G, NY, ISOTYPES). CUZCO: *Pennell 13,540*, Quiquijana, grassy wayside, herb, alt. 3220 m., Apr. 23, 1925 (ANS, F); *Soukup 40*, Urubamba, entrada al valle Lares, Jan. 3, 1936 (F); *Vargas 702*, Hda Urco, alt. 2940 m., 1938 (F); *Herrera 829*, Sazaihuamán, hills, alt. 3200–3600 m., Dec., 1928 (F); *Soukup* 254, near Puno, alt. 4000 m., Jan., 1936 (F). BOLIVIA: *Kuntze*, alt. 3600 m., Apr. 1–4, 1892 (NY). COCHABAMBA: *Steinbach 8799*, valle de Cochabamba, alt. 2600 m., 27 Dez., 1928 (ANS). LA PAZ: *Buchtien 6239*, Cotaña am Illímani, an Wassergräben, alt. 2500 m., Nov., 1911 (F, US); *Bang 1314*, vic. Sorata, 1892 (ANS, F, G, NY, US); *Rusby 501*, Sorata, alt. 10,000 ft., 1886 (ANS, G, M, US). ARGENTINA, SALTA: *Eyerdam & Beetle 22,631*, 14 km. west of Manuela Pedraza, Tartagal river, moist sand, stream-bank, semi-shade, perennial herb 1–1.5 m., alt. 900 m., Oct. 26, 1938 (G). [N. B. This specimen is the only one complete with underground system, a tuber about 3 inches long.] TUCUMÁN: *Venturi 930*, dept. Tafi, Yerba Buena, en una quebrada con agua, altura de la planta 1 m., flor amarilla, alt. 700 m., Sept. 24, 1920 (F, M, US); *Venturi 3995*, dept. Chicligasta, Estancia Las Pavas, en los prados, flor amarilla, alt. 1700 m., Dic. 11, 1926 [or 1925?] (G, US); *Job 1425*, Clavillo de Aconquija, flor verde, alt. 2800 m., 1937 (NY). CATAMARCA: *Jörgensen 1304*, El Candado, alt. 2700 m., Oct. 2, 1916 (G, M). CÓRDOBA: *Hieronymus*, am Ufer des Rio Primero bei Córdoba, Nov. 17, 1877 (F, US); *Kurtz 2707*, Córdoba, Rio I Cerro del Pueblo, Nov. 29–30, 1885 (NY); *Job 429*, La Falda, Cerro El Charrito, alt. 950 m., Jan., 1936 (US); *Kurtz 342*, San Virente, in umbrosis humidis frequens, Oct. 11, 1884 (NY); *Burkart 7193*, La Reducción, Córdoba, orilla de arroyos, hasta 2 m. de altura, Dec. 27, 1935 (G, US). FIG. 43, a and b.

This species is rather heterogenous but the herbarium material, although abundant, is rather unsatisfactory; most collections at hand are either unicates or made up of duplicates collected at different dates and localities; of a hundred or so herbarium sheets, only one had the underground system and even so it was damaged. Further segregations might well be possible, although I attempted it many times unsuccessfully.

44. T. **viridulum,** sp. nov. *Planta* viridula omnino glabra nullo modo glauca. *Folia* caulinaria perfecte 5-ternata, *petiolulis* rectis. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi. *Sepala* viridula ca. 4 mm. longa. *Antherae* acumen 0.5–1.0 mm.

Stylus una cum stigmate 8–10 mm. *Carpella* matura nullo modo gibbosa, ca. 7 mm. longo, *stipite* 0.7–1.0 mm., ventre 5.0–5.5 mm. longo, 3.0–3.2 mm. lato, *nervis* lateralibus plus minusve ramosis anastomosantibusque, nervo dorsali basi parum concavo, apice fere recto, ventrali convexo, *rostro* ad ventrum deflexo. An floret Junio et Julio?—PANAMA, CHIRIQUÍ: *Seibert 204*, valley of the upper Rio Chiriquí Víejo, vicinity of Monte Lirio, growing in rocky gorge, 1–1.5 m. tall, fls. green, styles and stamens pinkish-lavender, alt. 1300–1900 m., June 27–July 13, 1935 (NY, TYPE; G, N-ND, ISOTYPES). FIG. 44.

45. T. PANAMENSE Standley, Field Mus. Nat. Hist. Pub. Bot. **22:** 19, 1940. *Planta* 6–12 dm., *caule* ramis petiolisque plus minusve glaucis, omnino pubescens. *Pubescentia* e pilis capitatis translucidis. *Folia* caulinaria 4–5-ternata. *Stylus* una cum stigmate ca. 8 mm. *Carpella* matura sigmoidea nec gibbosa, ca. 6.5 mm. longa, *stipite* ca. 1 mm. ventre ca. 4.5 mm. longo, 2.0–2.2 mm. lato, *nervis* lateralibus simplicibus vel parum ramosis, nervo dorsali baso concavo, apicali convexo, ventrali convexiore quam dorsali, *rostro* ad ventrum deflexo. An floret Junio?—PANAMA, CHIRIQUÍ: *Davidson 791*, Boquete, flowers greenish, 2 to 4 ft. high, alt. 4500 ft., June 26, 1938 (F, TYPE). FIG. 45.

46. T. **Macbrideanum,** sp. nov. *Planta* elata omnino glabra ad 12 dm. attingens et verosimiliter arcuans. *Caulis* subteres. *Folia* inflorescentiae estipellulata 3–4-ternata. *Inflorescentia* ampla paniculata (an secunda?), *ramis* divaricantibus incurvatis foliosis. *Pedunculi* 2–3 cm. ad aetatem florendi, 4–5 cm. et parum curvati cum fructus permatuerunt, nec sub receptaculum reflexi. *Flores* perfecti cum *staminibus* 16–20 et *pistillis* 3–6. *Sepala* quatuor, late ovalia, 5.0–6.5 mm. longa. *Stamina* filamento 6–8 mm., *antheris* 2.5 mm. oblongo-lanceolatis, *mucrone* 0.3–1.2 mm. longo. *Stylus* una cum stigmate 12–15 mm. nonnunquam persistens. *Carpella* matura valde compressa, fere laminaria, semi-orbicularia, nervosa, nec gibbosa, *stipite* ca. 2 mm., ventre ca. 4.5 mm. longo, ca. 2.5 mm. lato, *nervo* ventrali semi-circulari, dorsali subrecto, lateralibus conspicuis rugosis curvatis nec ramosis nec sinuosis, *rostro* ad tergum deflexo. Floret Junio.—PERU: *Macbride 4466*, Tambo de Vaca, June 10–24, 1923, in patches, to 4 ft. high, pistils purple, anthers yellow, alt. about 13,000 ft. (G, TYPE: F, NY, US, ISOTYPES). FIG. 46, a–d.

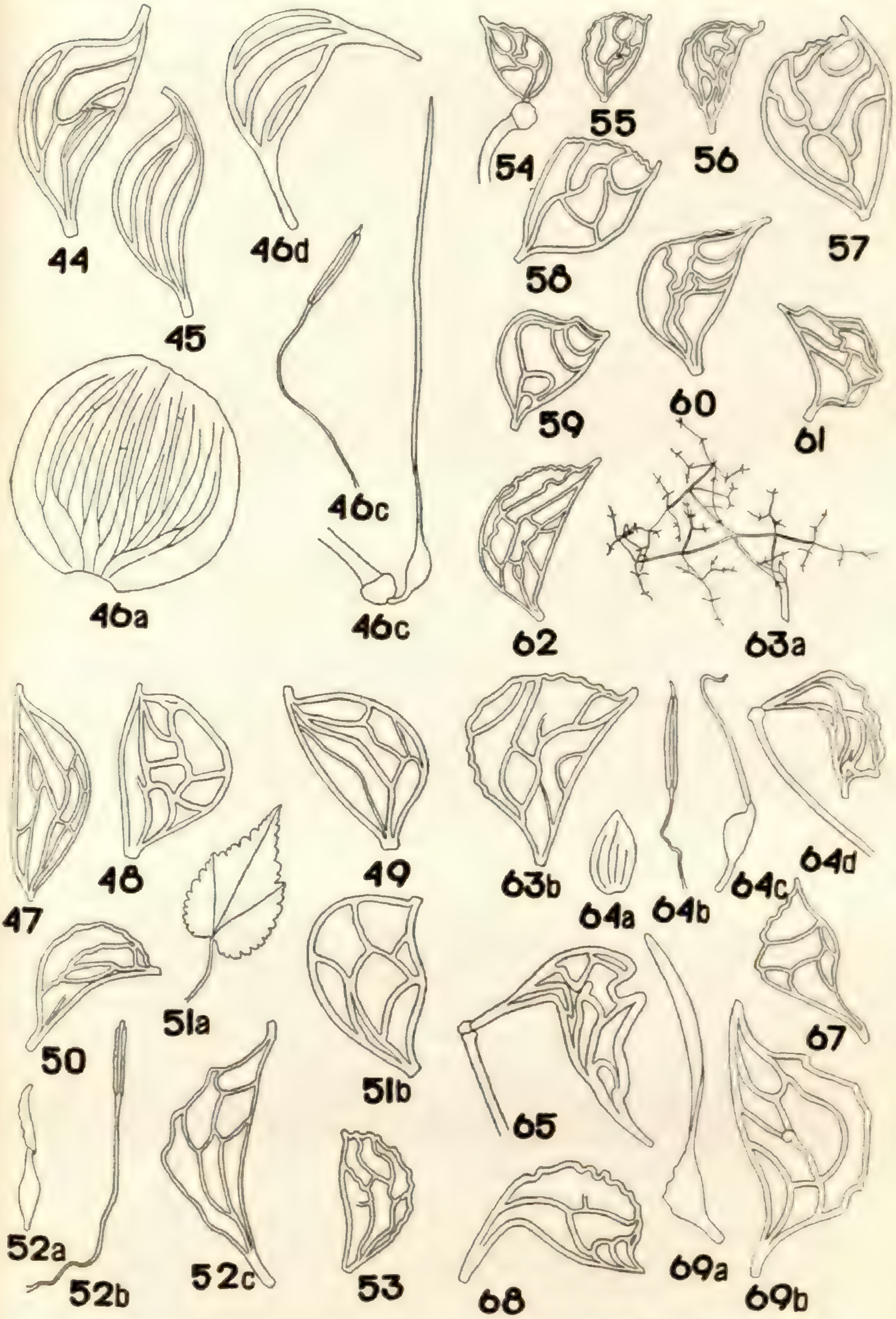
The type specimen is made up of three fragments evidently homogeneous, one with mature fruits, the second with half-open flowers, the third one larger, with flowers in full bloom. For this unusually fine herbarium specimen, we are thankful to the collector, J. FRANCIS MACBRIDE, and it is a pleasure to dedicate to him this new species. The length of the usually persistent

style sets this species apart from any other *Thalictrum* we know of. And before the stamens reach the length of the sepals, the style is already full grown.

47. T. **Deamii,** sp. nov. *Planta* omnino glabra. *Sepala* viridula ca. 25 mm. longa. *Filamenta* ca. 5 mm. *Antherae* ca. 4 mm., acumine ca. 0.5 mm. *Stylus* una cum stigmate 8.5–10.5 mm. *Carpella* matura ovato-lanceolata, 6.5–8.0 mm. longa, *stipite* usque ad 0.8 mm., ventre 6–7 mm. longo, ca. 2.5 mm. lato, *nervis* rugosissimis valde anastomosantibus parum undulatis nec tamen gibbosis, nervo dorsali fere recto vel parum convexo, ventrali convexiore quam dorsali. Tempus florendi ignotum.—MEXICO, TAMAULIPAS: *von Rozynski 558*, Sierra near San Lucas, Jamauve, July, 1932 (F, US). NUEVO LEÓN: *Kenoyer 120*, Monterrey, field, Sept. 18, 1937 (F). SAN LUIS POTOSÍ: *Pringle 5071*, Las Canoas, June 23, 1891 (G, TYPE). FIG. 47.

Dedicated to a botanist whom we admire very much for his patient and painstaking work, namely his herbarium specimens and his publications on the flora of Indiana. His Flora of Indiana contains the best key that was ever published to separate three very litigious species: *T. dasycarpum* Fisch. & Lall., *T. polygamum* Muhl. and *T. revolutum* DC.

48. T. GRANDIFOLIUM Watson, Proc. Am. Acad. **23:** 267, 1888, nec *T. grandifolium* Rose, Contrib. U. S. Nat. Herb. **5:** 143, 1897. *T. grandiflorum* Watson ex Rose, Contrib. U. S. Nat. Herb. **5:** 188, 1899, nec *T. grandiflorum* Maxim., Act. Hort. Petrop. **11:** 11, 1889, nec *T. grandiflorum* Rose, Contrib. U. S. Nat. Herb. **5:** 188, 1899.—*Planta* verosimiliter semimetralis ad sesquimetralis, saepius plus minusve glauca, omnino glabra nisi in *foliolis* infernis, tum pubescentia sparsa est e pilis crassiusculis brevibus opacis et coloratis. *Foliolae* variabiles ad 5 cm. longae et latae. *Petioli* foliorum caulinariarum saepius 2–6 cm., dilatatione petiolari exclusa. *Pedunculus* fructuum ad 6 cm. extendet, in primis parum incurvatus, in apicem valde recurvatus. *Flores* omnes perfecti (?) vel plurimi perfecti pauci masculi. *Sepala* 3–5 mm. longa. *Filamenta* 4.0–5.5 mm. *Antherae* 3.5–5.0 mm., acumine 0.5–1.5 mm. *Stylus* una cum stigmate 5–10 mm. *Carpella* matura substipitata, apice acuto vel saepius rotundo vel etiam prope rostrum retuso, 4.5–5.0 mm. longa, ventre ca. 4 mm. longo, 2.5–3.2 mm. lato, *nervis* valde ramosis anastomosantibusque nervo dorsali aliquid convexo, ventrali convexiore quam dorsali. Floret a Junio per Julium ad Augustum.—MEXICO, CHIHUAHUA: *Pringle 1513*, Sierra Madre, under cliffs, Oct. 17, 1887 (G, TYPE: ANS, CA, F, M, NY, UC, US, ISOTYPES); *Nelson 6007*, in the Sierra Madre, June 21–July 29, 1899 (G, US); *Hartman 751*,



Details of Flowers or Fruits of Thalictrum, all × 4, except 51a and 63a, these × ⅓.

(For explanation see end of paper.)

Pilares, Strawberry Valley, Sept. 22, 1891 (G); *M. E. Jones*, Soldier Canyon, alt. 6500 ft., Sept. 16, 1903 (CA, F, M, NY, UC, US); *LeSueur 1323*, Rio Negro, Aug. 29, 1937 (F); *Townsend & Barber 47*, near Colonia Garcia, alt. 7500 ft., June 23, 1899 (F, G, M, NY, US). DURANGO: *E. Palmer 357*, Durango and vicinity, Apr. to Nov., 1896 (F, G, M, NY, UC, US). NUEVO LEÓN: *C. H. & M. T. Mueller 899*, Cieneguillas to Puerto Santa Ana, about 15 miles SW of Galeana, commonly scattered in dense moist wood, flower straw with lavender stamens, June 28, 1934 (F). SAN LUIS POTOSÍ: *Pennell 17,910*, Las Canoas, rocky limestone hill, flowers purplish, alt. 100–1200 m., Aug. 6–7, 1934 (ANS). FIG. 48.

49. T. HERNANDEZII Tausch ex Presl, Rel. Haenk. **2:** 69, 1835. *T. puberulum* Aschen ex Lecoyer, Bull. Soc. Bot. Belg. **24:** 306, 1885, nomen subnudum cum synonymis editum. *Planta* omnino glabra viridula nec glauca, metrum approximans. *Flores* polygamo-monoici, pauci masculi, alii perfecti. *Sepala* 3–4 mm. longa, nonnunquam viridula. *Filamenta* ca. 5 mm. *Antherae* 3–3.5 mm., *acumine* circa millimetrali. *Stylus* una cum stigmate 8.5–10.0 mm. *Carpella* matura glauca semiovata ca. 5 mm. longa, *stipite* 0.2–0.5 mm., ventre ca. 4.5 mm. longo, 3.3–3.6 mm. lato, *nervis* plus minusve ramosis anastomosantibusque, nervo dorsali paululo convexo, ventrali conspicue convexiore quam dorsali. Floret Julio.—MEXICO, GUERRERO: *R. Q. Abbott 145*, Taxco, rank-growing, in damp or shady places, 1 meter or so tall, July 18, 1936 (G); idem, *237* and *238*, July 12, 1937 (G). FIG. 49.

The application of this specific name is not quite certain. It might well apply to *T. gibbosum* Lec. I have not seen the type, which is at Prague in the herbarium of the Museum. Lecoyer had not seen it either, but Dr. M. Willkomm studied it for him. The original description refers to a glabrous plant two feet high, from western Mexico, with ternate leaves, dioecious flowers and the nerves of the fruits oblique and uneven. There is no such *Thalictrum* amongst the thousands of specimens at hand. If the dioecious character is discarded, then it may be either *T. gibbosum* Lec. or the species just described above. Presumably Lecoyer had studied *T. Hernandezii* Tausch carefully enough to ascertain that it was not the same thing as his own *T. gibbosum*. Sensu Lecoyer, *T. Hernandezii* is what I am calling *T. Nelsonii* or *T. strigillosum*. I cannot agree with his interpretation, for Tausch very clearly says: "Caulis . . . una cum foliis floribusque glaber".

Subsectio **Gibbosa,** subsect. nov. Sect. *Camptogastrum*, d. *Podocarpa* PRANTL, Nat. Pfl., **3,** 2: 66, 1888. *Plantae* glabrae vel pubescentes. *Ovaria* 10 vel pauciora in flore. *Carpella* matura compressa nervis ramosis anastomosantibusque saepius sinuosis et reticulatis, *nervo* ventrali, licet dorsali lateralibusque, gibbosis. Species typica *Thalictrum gibbosum* Lec. sit.

50. T. PACHUENSE Rose, Contrib. U. S. Nat. Herb. **5:** 188, 1899. *Planta* 20–50 cm., *radicibus* fibrosis, nonnullis istorum parum in locis incrassatis. *Caulis* basis subterraneus directus aphyllus, ad transitionem saepius ramosus et *foliis* numerosis munitus. Caulis aerius nonnunquam aphyllus, frequentius tamen cum folio caulinari solitario et cum 1–3 foliis inflorescentiae. *Pubescentia* deest, nisi interdum inferne, si adest e pilis incrassatis brevibus coloratis et in fructubus e pilis capitatis minutissimis translucidis. *Foliolae* 1 cm. longae vel minores. *Inflorescentia* reducta. *Pedunculi,* fructubus maturis, paululum incurvati et sub receptaculo maxime recurvati. *Flores* omnes perfecti purpurascentes. *Sepala* 3–4 mm. longa. *Filamenta* 5–6 mm. *Antherae* 2.5–4.0 mm., *acumine* 0.2–0.5 mm. *Stylus* una cum stigmate 5–9 mm. *Carpella* matura 4–5 mm. longa, oblique clavata, interdum parum gibbosa, *stipite* 0.5–1.5 mm., ventre 3.4–3.6 mm. longo, 1.6–2.0 mm. lato, *nervis* undulatis ramosis anastomosantibusque, nervo dorsali concavo. Floret Julio Augustoque.—MEXICO, HIDALGO: *Pringle 6880,* Sierra de Pachuca, open woods, alt. 9000 ft., July 16, 1898 (US, TYPE; ANS, F, G, M, NY, UC, US, ISOTYPES); *Pringle 9678,* Sierra de Pachuca, alt. 9500 ft., Aug. 22, 1902 (F, G, M, NY, US); *Rose & Hay 5585,* Sierra de Pachuca, July 21 & 22, 1901 (US). Type not seen, stored away. FIG. 50.

51. T. STANDLEYI Steyermark, Field Mus. Nat. Hist. Pub. Bot. **22:** 229, 1940. *Planta* 1–3 m. pubescens nisi in floribus et in foliolis supernis. *Pubescentia* e pilis saepius brunneis interdum translucidis, aliis uniseriatis aliis stellatis stipitatisque. *Folia* 2–4-ternata. *Foliolae* profunde cordatae, apice acuminatae, saepius parum asymmetricae, raro trilobatae, per marginem totam dentatae, dentibus serratis apice rotundis mucronulatis, sinubus acutissimis. *Pedunculi* variis modis recurvati. *Flores* polygamo-monoici, alii perfecti, alii masculi. *Sepala* oblonga 6.0–7.5 mm. longa. *Filamenta* 7–8 mm. *Antherae* 4.0–4.5 mm., *acumine* 0.6–0.8 mm. *Stylus* una cum stigmate 9–11 mm. *Carpella* matura viridia carnosa obovata 4.5–5.5 mm. longa, *stipite* 0.2–1.0 mm., ventre 4.0–4.5 mm. longo, 2.5–3.0 mm. lato, *nervis* obscuris copiose anastomosantibus, nervo dorsali ad basem et superne paululum concavo, ad medias parum convexo, ventrali valde convexo. *Rostrum* dorsale ad superas insertum et deflexum ad tergum. Floret Februario et Martio.—GUATEMALA, SAN MARCOS: *Standley 86,335,* Barranco Eminencia, road be-

tween San Marcos and San Raphael Pie de la Cuesta, in upper part of the barranco between Finca La Lucha et Buena Vista, wet wooded quebrada, herb 1 m. tall, rare, alt. 2500–2700 m., Feb. 6, 1941 (F); *Steyermark 26,358*, Río Vega, near San Rafael and Guatemala-Mexico boundary, Volcán Tacaná, herb 5–8 ft. tall, leaves dull green above, grass-green beneath and rugose, sepals green, at base purplish, anthers pale yellow turning purplish, filaments light green, style purple, sepals erect, anthers expanding first, the pistils later, flowers polygamo-monoecious, stem-nodes purplish, alt. 2500–3000 m., Feb. 20, 1940 (F, TYPE); *Steyermark 37,067*, trail between Finca el Porvenir and San Sebastián, Volcán Tajumulco, alt. 1300–1400 m., March 1, 1940 (F, paratype); *Steyermark 36,821*, between town of Tajumulco and Tecutla (9 miles south and west of Tajumulco), northwestern slopes of Volcán Tajumulco, shaded thickets along quebrada, near top of barranco, herb 5–8 ft. tall, leaves membranaceous, rich green above, gray beneath, alt. 1800–2500 m., Feb. 27, 1940 (F, paratype). QUEZALTENANGO: *Standley 66,346*, mountains southeast of Palestina, damp dense forest, herb 5 ft., alt. about 2700 m., Feb. 22, 1939 (F, paratype); *Standley 66,338*, mountains southeast of Palestina, damp dense forest, tall coarse herb, alt. about 2700 m., Feb. 22, 1939 (F, paratypes); *Standley 84,240*, mountains southeast of Palestina, on old road to San Juan Ostuncalco, damp sandy hillside forest, herb 1–2 m. tall, common, alt. 2550–2850 m., Jan. 21, 1941 (F); idem *84,253* (F); *Standley 84,271*, mountains southeast of Palestina, on old road to San Juan Ostuncalco, damp sandy hillside forest, herb 1–1.5 m. tall, Jan. 21, 1941 (F). FIG. 51, a and b.

52. T. JOHNSTONII Standley & Steyermark, Field Mus. Nat. Hist. Pub. Bot. **22:** 229, 1940. *Planta* omnino glabra, 6 dm. alta vel altior. *Florum* plurimi perfecti, pauci masculi. *Sepala* 2.5–4.5 mm. longa. *Filamenta* 7–10 mm. *Antherae* 1.2–3.5 mm., *acumine* 0–0.2 mm. *Stylus* una cum stigmate anguste bialato 2–4 mm. *Carpella* matura ignota, fere matura 6–7 mm. longa, *stipite* ca. 1 mm., *nervis* lateralibus valde reticulatis, nervo dorsali paululum concavo, ventrali gibboso. Floret Majo et Junio. GUATEMALA, HUEHUETENANGO: *C. & E. Seler 2935*, Facaltenango, 21 juni 1896 (G, NY, US). EL QUICHÉ: *Heyde & Lux 2977*, Nebaj, alt. 6000 p., maj. 1892 (G, NY, US). SAN MARCOS: *Salas 368*, "Culantro de monte", San Cristobal Cucho, alt. 1920 m., June, 1923 (US). CHIMALTENANGO: *J. R. Johnston 1643*, Desconsuelo, June 20, 1940 (F, TYPE). FIG. 52, a–c.

53. T. LANATUM Lecoyer, Bull. Soc. Bot. Belg. **24:** 122, 1885. *Planta* omnino pubescens nisi per foliolas supernas et in floribus. *Pubescentia* e pilis 1–4 mm. flexuosis acicularibus opacis, densissimis in caule. Carpellorum tamen pubescentia e pilis capitatis translucidis sparsis. *Radix* fibrosa. *Flores* polygamo-monoici,

alii perfecti, alii masculi. *Sepala* 3.2–4.5 mm. *Filamenta* 3.5–6.0 mm. *Antherae* 2.5–4.0 mm., *acumine* 0.5–0.7 mm. *Stylus* una stigmate 3.5–8.0 mm. *Carpella* matura sessilia gibbosa ca. 3 mm. longa, ca. 1.8 mm. lata, *nervis* sinuosis reticulatisque, nervo dorsali fere recto vel concavo. Floret Majo et Junio.—MEXICO, PUEBLA: *Purpus 2714*, Cerro de Gentile, southwest Puebla, rocks, Aug., 1907 (UC). OAXACA: *Purpus 2714*♂, vicinity of San Luis Tultitlanapa, Las Naranjos, May, 1908 (F, G, M, NY, UC, US); *Galeotti 4575*, Oaxaca (syntype in the Paris Herbarium; F, photograph of this syntype); *Conzatti & Gonzalez 1208*, Huauchilla, alt. 2500 m., June 1901 (G); *Conzatti 1795*, Lomerios de San Felipe, Oaxaca, alt. 1700 m., junio 9, 1907 (F). FIG. 53.

The pubescence is longer than in any other species of *Thalictrum*. The fruits of *T. lanatum*, *T. parvifructum* and *T. Pennellii* are the smallest in this section of the genus. Other syntypes are *Galeotti 4548* pro parte, from Sola, and *Andrieux 1834*, from Mitla. Nothing of those two has been seen by me.

54. T. **Pennellii,** sp. nov. *Planta* verosimiliter submetralis, caule basi, foliolis superne et floribus exceptis, pubescens. *Pubescentia* translucida minutissima e pilis capitatis per foliolarum paginam inferiorem, alio translucida densa e pilis uniseriatis. *Radices* ignotae. *Pedicelli* directi centimetrales, attamen sub receptaculum recurvati. *Carpella* matura glabra, subsessilia refracta ovata, ca. 3 mm. longa, ca. 1.8 mm. lata, apice acutorostrata, *nervis* lateralibus ramosis et anastomosantibus, nervo dorsali convexo, ventrali convexiore quam dorsali et saepius gibboso quidem. Tempus florendi ignotum, item flores.—MEXICO, DURANGO: *Pennell 18,505*, El Salto, Aserraderos, rocky, andesitic, pineland canyon, alt. 2500–2530 m., Aug. 31, 1934 (ANS, TYPE). FIG. 54.

Dedicated to Dr. FRANCIS W. PENNELL of the Academy of Natural Sciences of Philadelphia.

55. T. **parvifructum,** sp. nov. *Planta* 3–5 dm., pubescens saepius per foliolas inferne, nunquam superne, interdum aliis locis. *Pubescentia* pilorum crassiusculorum opacorum coloratorum nonnunquam cum pilis capitatis translucidis intermixtorum. *Flores* polygamo-monoici. *Sepala* elliptica ca. 3 mm. longa. *Filamenta* ca. 3 mm. *Antherae* 2.5–3.0 mm., *acumine* 0.2–0.4 mm. *Stylus* una cum stigmate 3.0–5.5 mm. *Carpella* matura rostrata glabra obovata subsessilia 2.7–3.0 mm. longa, 1.6–1.8 mm. lata, *nervis* lateralibus ramosis undulatis anastomosantibusque, nervo dorsali convexo, ventrali convexiore quam dorsali et gibboso. Floret Julii mense.—MEXICO, SONORA: *Pennell*

19,555, ridge south of Arroyo Gochico, east of San Bernardo, base of cliff near summit, alt. 1050–1150 m., Aug. 5–9, 1935 (ANS, TYPE); *Gentry 1463*, Rio Mayo, Bakachaka, upper Sonorian, riparian, inconspicuous along the stream bank, a tolerant herb, July 5, 1935 (ANS, F, G, M, NY, UC, US). FIG. 55.

56. T. STRIGILLOSUM Hemsley, Diag. Pl. Nov. **1,** 1878. *T. papillosum* Rose, Contrib. U. S. Nat. Herb. **5:** 188, 1899. *T. jalapense* Rose, Contrib. U. S. Nat. Herb. **8:** 28, 1903. *Planta* nonnunquam omnino pubescens 2–10 dm. *Pubescentia* varia variabilisque semper tamen densa inferne in foliolis. Pubescentia caulinaris, si adest, vel e pilis capitatis, vel e pilis millimetralibus flexuosis acicularibus opacis, vel iisdem intermixtis. Pubescentia foliolarum superne e pilis capitatis cum adest, inferne e pilis crassiusculis brevibus coloratis densissimis, nonnunquam pilis capitatis intermixtis. Pubescentia carpellorum vel deest vel e pilis capitatis translucidis. *Radices* fibrosae. *Pedicelli* parum incurvati, sub fructum valde recurvati. *Flores* plurimi perfecti pauci masculi. *Sepala* 3.0–6.5 mm. longa. *Filamenta* 4.5–6.0 mm. *Antherae* 2.5–4.0 mm., *acumine* 0.4–0.5 mm. *Stylus* una cum stigmate 5–13 mm. *Carpella* matura 3.5–4.5 mm. longa, *stipite* 0.3–1.0 mm., ventre 2.5–4.0 mm. longo, 1.6–2.2 mm. lato, *nervis* gibbosis reticulatis, nervo dorsali fere recto, vel parum convexo, saepius tamen paululum concavo. Floret Majo, Junio, Julio et Augusto.—MEXICO, COAHUILA: *E. Palmer, 9*, Lerios, Feb. to Oct. 1880 (ANS, US); *Gregg 404*, near Saltillo, San Antonio, Sept. 2, 1848 (M). SAN LUIS POTOSÍ: *Purpus 5361*, Minas de San Rafael, May, 1911 (F, M, NY, UC). ZACATECAS: *Rose 2658*, near Monte Escobede, Aug. 27, 1897 (US, type of *T. papillosum;* G, US, isotypes). VERA CRUZ: *Rose & Hay 5674*, Mount Orizaba, July 25 and 26, 1901 (NY, US); *Rose & Hay 6188*, near Jalapa, Aug. 17, 1901 (US, type of *T. jalapense;* G, US, isotypes). HIDALGO: *Coulter 652*, Zimapan (G); *Purpus*, Ixmiquilpan, Sierra de la Mesa, July, 1905 (UC); *Clokey 1855*, Real del Monte, bank of stream, Oct. 1, 1910 (M, C-UC); *Pringle 6929*, Sierra de Pachuca, alt. 9000 ft., July 28, 1898 (ANS, F, G, M, NY, UC, US). MEXICO and DISTRITO FEDERAL: *Rose, Painter & Rose 8440*, Hacienda de la Encarnacion, July 7, 1905 (G, NY, US); *Rose & Painter 7185*, near Cima, Sept. 19, 1903 (G, NY, US); *Pringle 6422*, valley of Mexico, Pedrigal (lava beds), 1–3 ft., alt. 7800 ft., Aug., 1896 (ANS, F, G, M, NY, UC, US); *Schaffner 11*, vallée de Mexico, 1870–1880 (G, NY); *Mexia 2685*, Monte de Rio Frio, kilometer 49, road from Mexico City to Puebla, pine forest on slopes, in shade of thick pines, suffrutescent, spreading, up to 1 m., flowers yellowish, alt. 4000 m., July 31, 1929 (F, M, NY, UC); *Bourgeau 276*, vallée de Mexico, juin, 1865–66 (G, US, syntypes of *T. strigillosum*). MICHOACÁN: Arsène 5677, vicinity of Morelia alt. 2800 m., 1910 (US).

The type of this species has not been selected. Other syntypes, not seen, are *Andrieux 546* and *Schaffner's* collection from Tacubaya. The types of the two species given as synonyms have not been seen either, but isotypes of both were available for study. Fig. 56.

Except as to the type of pubescence and the size of the fruit, there is not much difference between *T. strigillosum* Hemsl. and *T. lanatum* Lec. They have, however, different ranges.

57. T. **laeteviride,** sp. nov. *Planta* 3–12 dm., omnino pubescens nisi in foliolis superne et in floribus. *Pubescentia* e pilis capitatis translucidis interdum tamen intermixtis in foliolis infernis cum pilis opacis brevibus capitatis. *Radices* fibrosae. *Pedunculi* parum incurvati sub fructum valde recurvatum. *Sepala* viridula ca. 3 mm. longa. *Antherae* 2–3 mm., *acumine* 0.3–0.4 mm. *Stylus* una stigmate 6–10 mm. *Carpella* matura sessilia 5.0–5.5 mm. longa, 3.5–3.8 mm. lata, *nervis* ramosis et reticulatis, nervo dorsali convexo, ventrali gibboso convexiore quam dorsali, *rostro* ad frontem deflexo. Floret Julio et Augusto. —Mexico, coahuila: *Johnston & Muller 463*, Sierra del Pino, vicinity of La Noria, open valley with scrub oaks and scattered pines, shaded arroyo-banks, 1–4 ft. tall,, Aug. 20–26, 1940 (G, type); *Stanford, Retherford & Northcraft 387*, lat. 25° 3′, long. 101° 18′, in arroyo on south slope of mountain, 24 kilo. northwest of Fraile, great variation of vegetation with many vines and other types of more southerly plants, plant 18–24 inches tall, alt. 2900 m., July 15, 1941 (G, M); *R. M. Stewart 2291*, north of La Noria, high central parts of the calcareous Sierra del Pino, north of high eastern ridges, frequent on open sunny slopes, becoming 8 dm. tall, Aug. 26, 1942 (G). Fig. 57.

58. T. lasiostylum Presl, Rel. Haenk. **2:** 70, 1835. *Planta* 40–65 cm. glabra nisi in foliolis inferne. *Pubescentia* sparsa e pilis crassiusculis coloratis brevibus. *Radix* ignota. *Flores* verosimiliter polygamo-monoici. *Stylus* una cum stigmate 5.0–6.5 mm. long. *Carpella* matura 5.0–6.5 mm. longa, *stipite* 0.5–1.0 mm., ventre 4–5 mm. longo, 3.0–3.5 mm. lato, *nervis* lateralibus sinuosis reticulatisque, nervo dorsali fere recto vel convexo, ventrali gibboso et convexiore quam dorsali. Tempus florendi mihi ignotum est.—Peru, lima: *Macbride & Featherstone 269*, Matucana, perennial among large granite rocks on steep northern canyon slope, about 8000 ft., Apr. 12–May 3, 1922 (F, NY); *Pennell 14,338*, Canta, open rocky slope, herb, alt. 2700–3200 m., June 11–19, 1925 (ANS, F, G). Fig. 58.

Type, not seen, in the herbarium of the Botanical Garden at Prague. Lecoyer assumed this specimen to have been errone-

ously attributed to Peru, that it was a Mexican specimen of *T. Hernandezii* Tausch. Indeed he had no other collection of *T. lasiostylum* Presl from Peru and both species are no doubt closely related. But as we have now two other collections it becomes clear that they are probably different enough to be kept specifically segregated.

59. T. SUBPUBESCENS Rose, Contrib. U. S. Nat. Herb. 8: 28, 1903. *Planta* submetralis vel sesquimetralis per foliolas inferne pubescens, aliis locis nunc glabra tum pubescens. *Pubescentia* densa e pilis capitatis translucidis. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi. *Sepala* 3.8–4.5 mm. longa. *Filamenta* 5–6 mm. *Antherae* 2.8–3.5 mm., *acumine* 0.2–0.4 mm. *Stylus* una cum stigmate 7–10 mm. *Carpella* matura 4–5 mm. long., 2.3–2.9 mm. lat., *stipite* 0.5 mm. vel breviore vel deente, *nervis* lateralibus ramosis reticulatisque, nervo dorsali fere recto vel parum convexo, ventrali gibboso convexiore quam dorsali. Floret Julio et Augusto.—MEXICO, MEXICO: *Pringle 1896*, Sierra de las Cruces, moist banks, 3–5 ft., alt. 10,000 ft., Aug. 14, 1896 (US, TYPE; ANS, F, G, M, NY, UC, US, ISOTYPES); *Pringle 11,917*, bluffs of barranca below Ozymba, alt. 8000 ft., Sept. 24, 1904 (F, G, US). FIG. 59.

Type not seen, but there is an abundance of isotypes at hand.

60. T. PUBIGERUM Bentham, Pl. Hartw., 3: 285, 1857. *T. tomentellum* Robinson & Seaton, Proc. Am. Acad. 28: 103, 1893. *Planta* submetralis vel subbimetralis omnino pubescens. *Pubescentia* e pilis uniseriatis translucidis densissimis. *Radices* fibrosae in locis paululum tuberosae. *Folia* caulinaria petiolis 2–8 cm., dilatatione petiolari exclusa. *Sepala* 3.7–4.5 mm. longa. *Filamenta* 4.5–6.5 mm. *Antherae* 2.0–3.5 mm., *acumine* 0.5–0.7 mm. *Stylus* una cum stigmate 5–7 mm. *Carpella* matura pubescentia, 3.5–5.0 mm. longa, 2.0–2.5 mm. lata, *stipite* 0–0.5 mm., *nervis* rugosis sinuosis reticulatisque, nervo dorsali parum convexo, ventrali convexiore quam dorsali. Floret Majo, Junio et Julio. —MEXICO: *T. C. & E. M. Frye 2640*, Laventa, Desierto de los Liones, alt. 3000 m., May 20, 1939 (M, NY, C-UC); *Plunkett 26*, Desert of the Lions, along stream, 3–6 ft. tall, July 8, 1932 (F). JALISCO: *Pringle 9679*, slopes of the barranca of Guadalajara, alt. 5000 ft., July 16, 1902 (F, G, M, NY, US); *Pringle 2479*, hillsides near Guadalajara, June 29, 1889 (ANS, F, G, M, NY, UC, US); *Rose & Painter 7360*, near Guadalajara, Sept. 28, 1903 (US); *Rose & Hough 4744*, near Tequila, July 5 and 6, 1899 (G, NY, UC, US). HIDALGO: *Pringle 7489*, valley near Tula, June 24, 1897 (G). MICHOACAN: *Pringle 4143*, low lands about Lake Patzcuaro, July 15, 1892 (G, type of *T. tomentellum;* ANS, F, M, NY, UC, US, isotypes). FIG. 60.

The TYPE of *T. pubigerum* Benth. is *Hartweg 1591, ad fluviorum margines prope Lagos.* It has not been seen.

61. T. **Conzattii,** sp. nov. *Planta* metralis omnino pubescens, nisi in carpellis. *Pubescentia* e pilis uniseriatis translucidis. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi. *Sepala* 2.8–3.5 mm. longa. *Filamenta* 3.5–4.0 mm. *Antherae* 2.0–3.3 mm., *acumine* 0.3–0.7 mm. *Stylus* una cum stigmate 5.0–6.0 mm. *Carpella* matura glabra 3.5–4.5 mm. longa, *stipite* ca. 0.5 mm., ventre 2.9–3.5 mm. longo, 1.8–2.2 mm. lato, nervo ventrali gibboso, lateralibus gibbosioribus et reticulatis, dorsali paululum concavo, vel subrecto. Floret Julio et Augusto.—MEXICO: VERA CRUZ: *Bourgeau 2726*, région d'Orizaba, 17 juillet, 1865–1866 (G); *G. L. Fisher 293*, Orizaba, alt. 4500 m., Aug. 9, 1924 (F, M, US); *Müller*, Orizaba, 1855 (NY); *Mohr*, Huatusco, July, 1857 (US); *Mohr*, Orizaba, in pratis et graminosis, sylvaticis (ANS); *Mohr*, Orizaba, julio, 1857 (US); *Mohr*, Orizaba, in sylvis montanis ad saxas calcares, julio, 1856 (US). MEXICO and DISTRITO FEDERAL: *Hinton 4200*, distr. Temascaltepec, Comunidad, alt. 2480 m., July 6, 1933 (M); *Hinton 3851*, Temascaltepec, Comunidad, by the river, alt. 2480 m., Aug. 5, 1933 (G, NY); *Langman 2509*, ¼ mile s. of Contadero, thickly wooded slopes, July 27, 1940 (ANS). OAXACA: *Conzatti & Gonzalez 314*, Etla, Canada de San Gabriel, alt. 3000 m., Aug. 8, 1897 (G, TYPE; US, ISOTYPE). FIG. 61.

62. T. **sessilifolium,** sp. nov. *Planta* metralis vel altior omnino pubescens. *Pubescentia* e pilis uniseriatis translucidis. *Folia* caulinaria sessilia vel fere sessilia in apice dilatationis petiolaris. *Sepala* 4.2–5.0 mm. *Filamenta* 6.0–7.5 mm. *Antherae* 2.6–6.5 mm., *acumine* 1.0–1.2 mm. *Stylus* una cum stigmate 5–12 mm. *Carpella* matura pubescentia, 5–6 mm. longa, ca. 2.5 mm. lata, *stipite* 0–1 mm., *nervis* lateralibus valde reticulatis, nervo ventrali gibboso, dorsali suberecto vel concavo. Floret Majo, Junio, Julio et Augusto.—MEXICO, MEXICO: *Harshberger 76*, Salaza, Sierra de las Cruces, alt. 11,000 ft., Aug. 13, 1896 (M, TYPE; ANS, G, NY, US, ISOTYPES). MICHOACAN: *Leavenworth 250*, west of Tancitaro, on edge of arroyo, herb 5–7 ft., alt. 6660 ft., July 15, 1940 (F, M, NY). PUEBLA: *Nicolas*, rancho Posadas, Hacienda Alamos, 1 août, 1909 (F, NY, US); *Arsène & Nicolas 5168*, près Puebla, Hacienda Noria, sur l'Atoyae, alt. 2170 m., 20 mai, 1910 (G, M, NY). FIG. 62.

63. T. **refractum,** sp. nov. *Planta* glabra metralis vel sesquimetralis. *Radices* fibrosae. *Rami petiolorum* paululum incurvati valde divaricati, saepius refracti. *Flores* polygamimonoici, plurimi perfecti, pauci masculi. *Sepala* 2.5–4.5 mm. *Filamenta* ca. 5 mm. *Antherae* 1.8–3.0 mm., *acumine* 0.5–1.0 mm. *Stylus* una cum stigmate 5–10 mm. *Carpella* matura

6.0–6.5 mm., *stipite* 0.5–1.0 mm., ventre 4–5 mm. longo, 3.0–3.2 mm. lato, *nervis* lateralibus sinuosis reticulatisque, nervo dorsali parum concavo, ventrali gibboso valde convexo. Floret a mense Junii usque ad Octobris.—COLOMBIA, CUNDINAMARCA: *Cuatrecasas 9664*, Cordilleria Oriental, vertiente oriental, cerca de Machetá, hierba de 1 metro, calis verde blanquecino con venas violáceas, antheras amarillas, alt. 2200 m., June 29, 1940 (US, TYPE); *Pennell 2398*, 2–3 m. sw. of Sibate, fl. purplish-green, alt. 2700–2800 m., Oct. 13–15, 1917 (G, NY, US). FIG. 63, a and b.

64. T. PENINSULARE (Brandegee) Rose, Contrib. U. S. Nat. Herb. **8**: 28, 1903. *T. vesiculosum* Lec., var. *peninsulare* Brandegee, Zoe, **4**: 399, 1894. *Planta* omnino glabra submetralis. *Radices* fibrosae. *Foliolae* membranaceae discolores, saepius trilobatae, basi cuneatae raro rotundae. *Flores* polygamo-monoici. *Sepala* 2.5–3.5 mm. long. *Filamenta* 3–6 mm. *Antherae* 3.0–3.5 mm., *acumine* 0.5–0.8 mm. Ovarii *stipes* 0.5–1.0 mm. *Stylus* una cum stigmate 5–8 mm. *Carpella* matura gibbosa 4–6 mm. longa, *stipite* 1–3 mm., ventre 3–4 mm. longo, 1.8–2.0 mm. lato, *nervis* lateralibus gibbosis ramosis anastomosantibusque, nervo dorsali basi concavo, superne convexo, nervo ventrali convexo et gibboso. Floret Septembris mense. An etiam Augusti?—MEXICO, BAJA CALIFORNIA: *Brandegee*, Saltillo, Sept. 17, 1893 (UC, TYPE and ISOTYPE); *Brandegee*, El Taste, Sept. 13, 1893 (G, NY, US, paratypes); *Brandegee*, Sierra de San Francisquito, Oct. 18, 1890 (UC); *Brandegee*, Sierra de Laguna, Jan. 23, 1890 (UC); *M. E. Jones 27,027*, Laguna Mountains, The Laguna, Sept. 22, 1930 (G, M, NY, UC, US); *Nelson & Goldman 7470*, from La Laguna to El Paraiso, alt. 5000–5800 ft., Jan. 29, 1906 (US). FIG. 64, a–d.

65. T. GIBBOSUM Lecoyer, Bull. Soc. Bot. Belg. **24**: 132, 1885. *T. grandifolium* Rose, Contrib. U. S. Nat. Herb. **5**: 143, 1897, nec *T. grandifolium* Watson, Proc. Am. Acad. **23**: 267, 1888; *T. grandiflorum* Rose, Contrib. U. S. Nat. Herb. **5**: 188, 1899; nec Watson ut in Rose, Contrib. U. S. Nat. Herb. **5**: 144, 1897, nec *T. grandiflorum* Maxim., Act. Hort. Petrop. **11**: 11, 1889. *T. obliquum* Rose, Contrib. U. S. Nat. Herb. **8**: 27, 1903. *T. stipitatum* Rose, Contrib. U. S. Nat. Herb. **8**: 28, 1903, nec *T. stipitatum* Rydb., Fl. Rocky Mts. 290, 1918. *Planta* metralis vel trimetralis, omnino glabra, plus minusve glauca. *Radices* fibrosae. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi. *Sepala* 3–5 mm. longa. *Filamenta* 3.5–6.0 mm. longa. *Antherae* 2–5 mm. *Stylus* una cum stigmate 5–14 mm. *Carpella* matura plus minusve gibbosa, 4–8 mm. longa, *stipite* 0.5–2.0 mm., ventre 4.0–5.5 mm. longo, 2–3 mm. lato, *nervis* ramosis et anastomosantibus, nervo dorsali basi concavo, superne convexo, nervo ventrali gibboso. Floret a Maji mense usque ad Novem-

bris.—MEXICO, MEXICO and DISTRITO FEDERAL: *G. L. Fisher 394*, Amecameca, July 24, 1924 (F, M, US); *Hinton et al. 6412*, dist. Temascaltepec, Crucero, 1.5 m. high, Aug. 28, 1934 (F, G, NY, US); *Hinton 5283*, dist. Temascaltepec, La Labor, oak woods, alt. 2100 m., Nov. 30, 1933 (M); *O. Kuntze 23,655*, Amecameca, alt. 8600 ft., Aug., 1904 (NY). MORELOS: *G. L. Fisher 35,229*, Tepoztlan, alt. 7500 ft., July 14, 1935 (F, NY, US); *Lyonnet 584*, Huizilac, Aug. 1930 (G, M, NY, US); *Rose & Painter 6966*, near Cuernavaca, Sept. 10, 1903 (NY, US); *Rose & Rose 11,121*, near El Parque, Aug. 15, 1906 (US); *Pringle 11,338*, near Cuernavaca, Gautepec, limestone hills, alt. 4000 ft., Oct. 27, 1902 (G, US); *Pringle 11,915*, Cuernavaca, barranca bluffs, 4–6 ft., alt. 5000 ft., July 20, 1904 (F, G, US); *Pringle 13,771*, Cuernavaca, wet places, 4–6 ft., alt. 5000 ft., July, 1906 (G, US); *Pringle 6511*, wet barranca above Cuernavaca, 6–10 ft., alt. 6500 ft., Sept. 21, 1896 (US, type of *T. stipitatum* Rose; ANS, F, G, M, NY, UC, US, isotypes); *Pringle 6392*, near Cuernavaca, wet shaded places, five to eight feet high, stem leaves four to six, alt. 5000 ft., July 28, 1896 (US, type of *T. grandifolium* Rose and *T. grandiflorum* Rose; ANS, F, G, M, NY, UC, US, isotypes). PUEBLA: *Amable & Arsène 2022*, dist. Tepeaca, Acatzinco, alt. 2110 m., julio 1907 (US); *Arsène 1445*, près Puebla, barranca de l'Alseseca, Hacienda de Batan, près de Totimehuacan, alt. 2120 m., June 13, 1907 (G, US); *Arsène 2258*, dist. Tepeacan, La Barranquilla, alt. 2110 m., July, 1907 (M, US); *Pringle 9541*, Amozoc, bluffs of gulches, alt. 7000 ft., Sept. 10, 1901 (US, type of *T. obliquum;* F, G, M, isotypes). OAXACA: *Galeotti* 4549 pro parte, Juquila del Sur (Paris Museum, TYPE of *T. gibbosum;* F, photograph of the type); *Pringle 5821*, cuesta de San Juan del Estado, Aug. 20, 1894 (G); *E. W. Nelson 1579*, valley of Oaxaca, alt. 6500–7800 ft., Oct. 3, 1894 (US). FIG. 65.

The types of none of the species listed above have been seen. However, I have at hand a photograph of one of them, furnished by the Field Museum, and numerous isotypes of the others. The material listed under the name *T. gibbosum* Lec., is fairly heterogeneous, but all attempts to segregate it along satisfactory lines have been unsuccessful.

66. T. LONGISTYLUM HBK. ex DC. Syst. 1: 171, 1817. *Planta* 12 dm., glabra nisi per foliolas inferne. *Pubescentia* sparsa e pilis crassiusculis, brevibus, opacis. *Caulis* teres flexuosus *nodis* inflatis, sulcatus, validissimus tamen nec facile compressione pertritus. *Sepala* 3–5 mm. *Filamenta* 4–5 mm. *Antherae* 2.5–4.0 mm., *acumine* ca. 0.4 mm. *Carpella* stipitata gibbosa dorso basi concavo, parte apicali convexo. *Stylus* una cum stigmate 8–10 mm. *Carpella* matura ignota. Floret Aprili,

Majo, et verosimiliter Martio.—Peru: *Dombey* (Paris Museum, type; F, isotype and a photograph of the type). Lima: *Macbride & Featherstone 409*, Matucana, in shrubby thicket on western slope, 4 ft. high, bracts rose-green, anthers yellowish, alt. about 8000 ft., Apr. 12–May 2, 1922 (F, NY).

It is possible that the flowering material at hand might belong to some species already described from the fruiting stage, but the material is still too scanty to elucidate this point.

67. T. rutidocarpum DC. Syst. **1:** 172, 1817. *Planta* 8–13 dm., glabra, foliolis inferne exceptis. *Pubescentia* sparsa e pilis crassiusculis brevibus opacis. *Caulis* sulcatus facillime pertritus. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi. *Sepala* 4–5 mm. longa. *Filamenta* ca. 6 mm. *Antherae* ca. 3 mm., *acumine* 0.3–0.4 mm. *Stylus* una cum stigmate 3.5–6.5 mm. *Carpella* matura 5.5–6.0 mm. longa, *stipite* ca. 2 mm., ventre subrhomboideo ca. 4 mm. longo, ca. 2.8 mm. lato, *nervis* lateralibus paucis ramosis et anastomosantibus, nervo dorsali ad basem et superne concavo ad medias paululum convexo, ventrali gibboso et convexo. Floret Januario et Februario.—Peru: *Dombey* (Paris Museum, type; F, photograph and fragment of type). Apurimac: *Stork & Horton 10,693*, prov. Andahuaylas, Pincos, rainy-green shrubland, humus over sand, annual herb 1.3 m., monoecious, general color of fl. variable green to purple, fr. an immature follicle, alt. 2700 m., Feb. 19, 1939 (F). Huancavelica: *Stork & Horton 10,268*, prov. Tayacaja, Salcabamba, part shade, among shrubs, annual herb reaching 1 m., monoecious, stamens greenish yellow, conspicuous, follicles partly mature, alt. 3250 m., Jan. 7, 1939 (F). Fig. 67.

68. T. vesiculosum Lecoyer, Bull. Soc. Bot. Belg. **24:** 130, 1885. *Planta* omnino glabra saepius haud glauca, metralis vel sesquimetralis. *Radices* fibrosae. *Flores* polygamo-monoici, plurimi perfecti pauci masculi. *Sepala* 5.0–6.5 mm. longa, ovata. *Antherae* 3.0–3.5 mm., *acumine* ca. 0.5 mm. *Filamenta* ca. 7 mm. *Stylus* una cum stigmate 7–10 mm. *Ovarii* stipes 0.5–1.5 mm. *Carpella* matura 7.0–7.5 mm. longa, *stipite* 1.0–2.5 mm., ventre 4.5–5.3 mm. longo, ca. 3.3 mm. lato, *nervis* lateralibus ramosis anastomosantibusque, nervo dorsali ad basem concavo ad medias et superne parum convexo, ventrali convexiore quam dorsali et gibboso. Floret a mense Martii usque ad Julii. —Ecuador: *Spruce 5470*, in Andibus, 1857–1859 (NY, syntype); *Jameson* (US); *André 2100*, San Juan, Quindio, 8 martii, 1876 (F, NY); *Jameson 130*, Quitensian Andes at 11,000 feet of elevation, July, 1859 (NY). Pichincha: *Firmin 157*, Cerra del Cinto, Ugshu-Cinto, Camino, alt. 3250 m., Jul. 28, 1927 (US); *Jameson*, Pichincha, alt. 11,000 feet of elevation (NY); *Firmin 680*, borde del camino de La Magdalena al Cinto, pl. algo frecu-

ente en los matorrales, alt. 3100 m. [?], Oct. 25, 1928 (US). BOLIVAR: *Penland & Summers 589*, Hacienda Talahua, 1 m. tall, alt. 330 m., May 1, 1939 (F, US). AZUAY and CAÑAR: *Hitchcock 21,674*, between Cuenca and Huifgra, moist shady ravine, alt. 2700–3000 m., Sept. 11–13, 1903 (US); *Penland & Summers 1014*, Tipococha, up to 1½ meters, alt. 3200 m., July 11, 1939 (F, US). PERU, CUZCO: *Herrera 3070*, Apurimac Valley, "Pinco", 1931 (US). FIG. 68.

Other syntypes not seen are *Mandon*, Sorata; *Jameson 212; Hieronymus*, Sierra Chica, Rio primero; *Goudot*, Bogota; *Jameson*, Artisana. These syntypes might be heterogeneous for they include a far greater range than the one we have accepted. There seems, however, to be some material of this species from Bolivia amongst *Rusby 501–502*, but we do not dare try to disentangle that mixture.

69. T. **Nelsonii,** sp. nov. *Planta* elata omnino pubescens. *Pubescentia* e pilis capitatis translucidis nisi in foliolis inferne ubi pili capitati cum pilis brevibus opacis truncatis intermixti sunt. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi. *Sepala* ca. 5 mm. longa. *Filamenta* ca. 8 mm. *Antherae* ca. 3 mm., *acumine* ca. 0.5 mm. *Stylus* una cum stigmate 6–7 mm. *Carpella* matura conspicue gibbosa, 7–8 mm. longa, *stipite* 1.5–2.0 mm., ventre ca. 6 mm. longo, ca. 3.5 mm. lato, *nervis* lateralibus gibbosis reticulatis, nervo dorsali ad basem concavo, ad medias et superne convexo, ventrali convexiore et gibboso. Floret a Junio usque ad Octobrem.—MEXICO, OAXACA: *Nelson 1788*, near Rayes, alt. 6700–10,000 ft., Oct. 20, 1894 (G, TYPE; US, ISOTYPE); *Conzatti & Gomez 2424*, dist. Cuycatlan, Cuyamecalco, alt. 1800 m., junio 23, 1909 (F, US). FIG. 69.

70. T. PODOCARPUM HBK. ex DC. Syst. **1:** 171, 1817. *Physocarpum podocarpum* (DC.) Bercht. & Presl, O Priroz. Rostl. **1:** 15, 1823. *T. cordifolium* Willd. ex Lec. Bull. Soc. Bot. Belg. **24:** 262, 1885, nomen nudum ut synonymon. *Planta* circa sesquimetralis omnino glabra. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi. *Sepala* ovata 4–7 mm. longa. *Filamenta* 3–7 mm. *Antherae* 3.0–4.5 mm., *acumine* 0.3–1.0 mm. Ovarii *stipes* 0.5–1.5 mm. *Carpella* matura caesia valde compressa apice acuta 9.0–10.5 mm. longa, *stipite* 2.5–3.0 mm., ventre 6.0–6.5 mm. longo, 2.8–3.3 mm. lato, *nervis* lateralibus reticulatis nullo modo gibbosis, nervo dorsali ad basem concavo ad medias superneque vel fere recto vel parum convexo, ventrali convexo saepius gibboso. Floret Junio, Septembri, Decembri et aliis.—VENEZUELA: *Cardona 299*, Táchíra, Páramo de Tamá, alt. 3100–3300 m., July, 1939 (US); *Gehriger 180*, Mucurubá, quebrada vel pueblo, en las orillas y vegas de un riachuelo, cerca

de la casas, planta de 1.50 m., n. v. Colanillota, alt. 2500 m., junio 18, 1930 (ANS, F, M, NY, US); *Linden 362*, hautes Andes de Truxillo et de Merida, depuis 4000 jusqu'à 14,500 pieds de hauteur, 1842 (F). COLOMBIA: *Bonpland* (Paris Museum, TYPE; F, photograph and a few leaflets from the type); *Weddell 3808*, prov. Tomina, dépt. Chuquisaca, déc., 1845–janv., 1846 (F); *Triana*, Andes de Bogota, Quindio, vulgo "lutantillo" [?], alt. 2000–2700 m., 1851–1857 (NY); *Pennell 10,332*, dept. Caldas, Rio San Rafael below Cerro Tatama, clearing along stream, alt. 2400–2600 m., Sept. 7–11, 1922 (ANS, G, US); hb. *Parseval-Grandmaison*, Mt. Serrate près Bogota, 1861 (G); *Pennell 6898*, dept. of El Cauca, above Papayan, along stream, herb, flowers greenish-white, alt. 1750–1800 m., June 19, 1922 (ANS, G, US); *Killip & Smith 16,017*, dept. Santander, vicinity of Las Vegas, thicket, coarse herb, sepals green, anthers yellow, alt. 2600–3000 m., Dec. 21–23, 1926 (G, NY, US). ECUADOR: *Jameson 202*, Quito (US). FIG. 70, a and b.

Subsectio **Venturiana,** subsect. nov. *Flores* perfecti (!). *Antherae* apice truncatae. *Ovaria* 18–36 in flore. *Stigma* paululum clavatum. *Carpella* matura globosa *nervis* sinuosis gibbosisque.

T. inuncans nostrum might, perhaps, just as well belong to this group, but until the fruits of that species are known, it is not possible to settle this question. Its ovary is perfectly smooth, a fact suggesting that the fruit may not be gibbose at all, but this relation does not always hold true.

71. T. **Venturii,** sp. nov. *Planta* omnino glabra, 5–9 decimetrorum. *Radices* fibrosae paucae, parum tuberosae. *Folia* estipellulata, 3–4-ternata *petiolulis* arcuantibus, *stipellis* reductis. *Foliolae* tenues. *Inflorescentia* foliosa, pauciflora, paniculata nec apice racemosa. *Flores* lutei perfecti (!), 6–12 in planta. *Sepala* ovalia, nec satis nota. *Stamina* 12–20 in flore. *Filamenta* capillacea subrigida, 5.5–7.0 mm. *Antherae* luteae, oblongo-lineares, apice squarrosae vel retusae, 2.0–2.5 mm. *Pistilla* numerosa 18–36 in flore, stipitata, inflata, *stigmate* 2.5–6.0 mm., parum clavato, apice obtuso, aliquandiu persistente. *Carpella* matura numerosa ventre globoso 2.0–2.5 mm., *nervis* gibbosis et sinuosis, nervo dorsali fere tam convexo quam ventrali. Floret Decembri.—ARGENTINA, SALTA: *Venturi 10,026*, dept. Guachipas, Alemania, bajo bosque alto, flor amarilla, Dic. 15, 1929 (G, TYPE; M, NY, US, ISOTYPES). TUCUMÁN: *Venturi 7713*, dept. Burroyaco, Cerro del Campo, en el alisal, flor amarilla, Dec. 15, 1928 (F, G, US); *Venturi 3995*, (parte), dept. Chicligasta, Estancia Las Pavas, en los prados, flor amarilla, Dec. 11, 1925 (G). CATAMARCA: *Jörgensen 1304* (pars), dept. Andalgala, El Candada (US). FIG. 71, a–c.

Sectio **Pelteria** sect. nov. *Planta* glabra, vel pubescens, nonnunquam glauca vel lucida vel scabra, *radicibus* fibrosis. *Folia* 1–6-ternata *foliolis* peltatis. *Flores* omnes perfecti vel polygamo-monoici, cum alii perfecti alii masculi sunt. *Pedunculi* sub fructu reflexi. *Filamenta* filiformia purpurascentia. *Sepala* ovata virescentia vel plus minusve purpurascentia. *Stigmata* filiformia, 1–10 in flore, decidua. *Carpella* matura compressa inaequilateralia, subsessilia vel stipitata. Species typica *Thalictrum peltatum* DC. sit.

This section is restricted to the mountaineous regions of Mexico and Central America. Other species with peltate leaflets also occur in Eastern Asia, but they belong to another subgenus.

In most sections of the genus, the vegetative characters are highly variable and furnish but few characters to distinguish species. Contrariwise, in this section a most satisfactory key can be drawn up entirely on vegetative characters. As for the flowers, they offer but few instances of good characters permitting separation of the species from one another. The fruits offer much better characters but they are deceptive in that the immature fruit may be larger, longer, more compressed, more recurved and less stipitate than the mature one.

Full many a species of this section has been described as polygamous or dioecious. With the help of a good binocular, thorough examination was undertaken of all the flowering material and it failed to reveal any pistillate or staminate plant. In many species all flowers are perfect, in others each plant bears both perfect and staminate flowers. Staminate flowers tend to bloom later than the perfect ones.

Subsectio **Subpeltata,** subsect. nov. *Planta* glabra vel pubescens vel scabra. *Folia* 3–6-ternata, petiolata. *Foliolae* prope marginem insertae 3–7-lobatae, vel grosse 3–7-dentatae. *Flores* omnes hermaphroditi, vel plurimi perfecti et pauci masculi in planta.

a. Pili omnes brevissimi capitati . . . . *b.*
  b. Caulis glaber . . . . . 72. *T. Lankesteri.*
  b. Caulis pubescens . . . . . 73. *T. Torresii.*
a. Pauci pilorum aciculares semimillimetrales vel longiores 74. *T. guatemalense.*

72. T. Lankesteri Standley, Field Mus. Nat. Hist. Pub. Bot. **18:** 435, 1937. *Planta* glabra nisi per foliolas, verosimiliter metralis. *Pubescentia* e pilis capitatis vel crassiusculis brevissimis. *Radix* fibrosa. *Antherae* ca. 2.5 mm., *acumine* 0.5–1.0

mm. *Filamentum* ca. 3.5 mm. *Stylus* una cum stigmate 8–10 mm. *Carpella* matura compressa, glabra vel pubescentia, ca. 6 mm. longa, ventre 4.5–5.0 mm. longo, 2.2–2.5 mm. lato, *stipite* 0.5–1.0 mm., *nervis* lateralibus valde anastomosantibus nervo dorsali fere recto. Floret Junio.—COSTA RICA: *Brenes 14,506*, près San Ramon, pentes rocheuses du cerro de San Isidro, alt. 1300 m., 14 junio, 1901 (G, US); *Solis 297*, Icsasu, cerro de Molti, alt. 1300 m., Aug., 1935 (F, M); *Tonduz 8951*, La Verbena, Aug., 1894 (US); *C. H. Lankester 337*, Concaves, rocky slopes, July, 1919 (F, TYPE and ISOTYPE). FIG. 72, a–d.

73. T. **Torresii** Standley & Boivin, sp. nov. *Planta* metralis omnino pubescens, nisi in carpellis cum *pubescentia* est e pilis capitatis. *Folia* caulinaria sessilia in apice dilatationis petiolaris. *Sepala* elliptica 2.5–3.0 mm. longa. *Antherae* ca. 3.5 mm., *acumine* millimetrali. *Filamenta* ca. 5.5 mm. *Stylus* una cum stigmate 5.0–7.5 mm. *Carpella* matura compressa sessilia ca. 7.5 mm. longa, ca. 2.0 mm. lata, *nervis* fere simplicibus, nervo dorsali concavo.—COSTA RICA: *Torres 187*, Santa Lucia, Paraiso, terreno pedregoso, altura planta 1 m., tiene en las hojas una sustancia pegajosa, 28 julio, 1927 (US, TYPE); *Valerio 1652*, Tiquires, alt. 1700 m., July 1, 1937 (F). FIG. 73, a–d.

74. T. GUATEMALENSE C. DC. & Rose, Contrib. U. S. Nat. Herb. **5:** 88, 1899. *T. peltatum*, var. β *hirsutum* Loes., Bull. Herb. Boiss. 2° série, **3:** 89, 1903. *T. hondurense* Standley ex Yuncker, Field Mus. Nat. Hist., Bot. **17:** 362, 1938. *Planta* omnino pubescens, plus minusve scabra, 8–12–(20) dm. *Pubescentia* e pilis aliis capitatis crassiusculis truncatis aliis elongatis flexuosis. *Radix* fibrosa. *Folia* caulinaria saepius 4-ternata *petiolo* brevi, vel sessilia in apice dilatationis petiolaris. *Pedicelli* plus minusve recurvati. *Sepala* elliptica 3.0–3.5 mm. longa. *Antherae* 4–5 mm., *acumine* 0.5–1.0 mm. *Filamenta* 3.5–4.0 mm. *Stylus* una cum stigmate 6–9 mm. *Fructus* compressus 3.5–5.5 mm. longus, ventre 3.0–4.5 mm. longo, 1.5–2.0 mm. lato, *stipite* 0–0.5 mm., *nervis* parum ramosis reticulatisque, nervo dorsali fere recto vel concavo. Floret Junio vel Julio vel Augusto.—MEXICO, MEXICO: *Hinton et al. 4263*, Temascaltepec, Tejupilco, llano, stalks 1 m., July 31, 1935 (M); *Hinton 4530*, Temascaltepec, Nanchititla, in the water, 2 m. high, Aug. 15, 1933 (G, NY, US); *Matuda 1739*, Cascada Siltepechis, Ago. 5, 1937 (F, G, M, NY). MICHOACAN: *Arsène 5282*, vicinity of Morelia, Loma Santa Maria, alt. 1950 m., Sept. 4, 1910 (G, M, NY, US); *Arsène 2610*, près Morelia, Cuincho, alt. 1900 m., July 1, 1909 (G, M, NY, US); *Leavenworth & Hoogstraal 1232*, Tancitaro region, two miles south of Uruapan, rocky land, very hirsute almost prickly, very common, alt. 5577 ft., July 29, 1941 (F, M, NY). CHIAPAS: *Matuda 4389*, near Siltepec, Honduras, in encinal, alt. 1500 m., July 9, 1941 (M); *Purpus 6798*, Cerro del

Boqueron, Sept., 1913 (UC); *E. W. Nelson 3236e*, near San Cristobal, alt. 7000–8000 ft., Sept. 18, 1895 (US). GUATEMALA: *S. Hayes*, Las Vacas barranca, June 1860 (G, US). HUEHUETENANGO: *C. & E. Seler 3153*, unter Gebüsch auf dem Coes von Zac-ulen bei Huehuetenango, 17 juni, 1896 (G, NY, US, isotypes of *T. peltatum* var. β *hirsutum*); *C. & E. Seler 2857*, Checulá, auf den mit Busch u. Wald bewachsenen Steinfalzungen alter Bauten, 28 aug., 1896 (G, NY, US); *Standley 81,212*, mountains west of Aguacatán on the road to Huehuetenango, oak forest, herb 1 m. tall, alt. about 1950 m., Dec. 27, 1940 (F); *Standley 81,566*, near Puente de Xinaxó, along road 13 km. west of Huehuetenango, pine-oak forest, herb 1 m. tall or less, common but out of flower, alt. about 1800 m., Dec. 30, 1940 (F); *Standley 81,973*, along Aguacatán road east of Huehuetenango at km. 13–14, damp forested quebrada, common, alt. about 1950 m., Jan. 2, 1941 (F); *Standley 83,010*, east of San Rafael Pitzal, near crossing of Rio San Juan Ixtán, open oak forest, herb 1 m. tall, common, alt. about 1730 m., Jan. 9, 1941 (F). BAJA VERAPAZ: *Cook & Doyle 254*, Santa Rosa, May 28, 1904 (US); *von Türckheim 1313*, Santa Rosa, im Walde, alt. 5000 p., Juli, 1887 (F, G, US); *von Türckheim 2307*, zwischen Santa Rosa und Patal, Wald, alt. 1600 m., Juli, 1908 (F, G, NY, US). ZAPACA: *Steyermark 29,676*, Sierra de las Minas, between Río Hondo and Finca Alejandria, moist forested slopes, alt. 1700–2000 m., Oct. 11, 1939 (F); *Steyermark 29,654*, along trail between Río Hondo and summit of mountain at Finca Alejandria, pine-covered slopes, rocky places, alt. 1000–1500 m., Oct. 11, 1939 (F). CHIMALTENANGO: *Standley 57,897*, along road from Chimaltenango to San Martín, wet thicket, common but past fruit, herb 3–4 ft., alt. 1500–1900 m., Nov. 25, 1938 (F); *Standley 57,927*, eodem, damp forest, herb 3 ft., alt. 1500–1900 m., Nov. 25, 1938 (F); *Standley 61,561*, southeast of Patzúm, barranco de La Sierra, pine and oak forest, herb 3–4 ft., common, alt. about 2100 m., Dec. 31, 1938 (F); *Standley 80,039*, southeast of Chimaltenango, along Río Guacalate, oak forest, common but past flowers, alt. about 1700 m., Dec. 14–23, 1940 (F). SACATEPEQUEZ: *Gomez 794*, Santiago, alt. 6500 p., 1891 (G, US, paratypes of *T. guatemalense*); *Standley 58,980*, cuesta de la Canas, above Antigua, damp thicket, herb 4 ft., alt. about 1950 m., Dec. 6, 1938 (F); *Standley 80,994*, along Río Guacalate, on road between Antegua and Chimaltenango, alt. about 1660 m., Dec. 23, 1940 (F). GUATEMALA: *Deam 6096*, on top of mountain, growing among rocks, June 1, 1909 (G, US); *Tonduz 657*, près de Guatémala, dans les broussailles des collines, juin 1921 (G, NY, US); *Aguilar 249*, 1939 (F). SANTA ROSA: *Heyde & Lux 3933*, Cenaguilla, alt. 4000 p., Sept., 1892 (G, M, NY, US). JALAPA: *Steyermark 32,541*, Cerro Alcoba, just east of Jalapa, oak woods, alt. 1300–1700 m., Dec. 2, 1939 (F);

Standley 76,810, *76,823*, on hills northeast of Jalapa, rocky scrub-oak forest, herb 1 m. tall, alt. 1400–1600 m., Nov. 10, 1940 (F). Honduras, comayagua: *Yuncker, Dawson & House 5796*, near Siguatepeque, on rocky hillside, plants about 4 ft. tall, more or less viscid and with pungent odor, roots a rich yellow color, June to Aug., 1936 (F, type; G, M, NY, US, isotypes of *T. hondurense*). Fig. 74, a–d.

The type of *T. guatemalense* C. DC. & Rose (*Heyde 164*) was stored away and could not be seen.

Subsectio **Eupeltata** subsect. nov. *Planta* glabra vel pubescens e *pilis* multiseriatis translucidis, vel crassiusculis opacis truncatis, nonnunquam glauca vel valde lucida. *Foliolae* ampliores rotundae vel obovatae, *petiolis* circa tertias insertis. *Flores* polygamo-monoici, plurimi perfecti, pauci masculi, nisi *Thalictro Treleasii* nostro cujus omnes perfecti sunt. Species typica *Thalictrum peltatum* DC. sit.

Whether the leaves are dull, shining or glaucous can not be relied upon as a specific character in this section, if we judge by what occurs in *T. Pringlei* Wats. None of the other species has been collected at all stages throughout the year, but they are likely to follow a course of development parallel, if not similar, to that of *T. Pringlei*.

a. Planta glabra, etsi pubescens nullo modo scabra....*b*.
  b. Folia omnia petiolata, petiolo baso dilatato....*c*.
    c. Planta glabra....*d*.
      d. Foliolae membranaceae, per marginem fere totam crenatae, crenis ca. 20 in foliola.....75. *T. Treleasii*.
      d. Foliolae coriaceae, ad apicem grosse dentatae vel crenatae, crenis dentibusve 0–10 in foliola....*e*.
        e. Planta fere metralis, antheris acumen subequantibus, stylo una cum stigmate 8–13 mm.....76. *T. peltatum*.
        e. Planta 0.35–0.80 metri, antheris quater ad sexies longior quam acumine, stylo una cum stigmate 6–9 mm.....77. *T. Pringlei*.
    c. Planta, nisi in foliorum facie superna, pubescens, foliolis per ambas paginas valde rugosis.
      78. *T. Pringlei*, var. *reticulatum*.
  b. Folia omnia, nisi inflorescentiae reducta, sessilia in apice dilatationis stipularis....*f*.
    f. Foliolae 9 in foliis singulis caulinaribus et in inflorescentiae nonnullis.....79. *T. Roseanum*.
    f. Foliolae 11–12 in foliis singulis nisi in inflorescentiae reductis....*g*.
      g. Antherae 3.0–4.5 mm., carpella matura 8.5–10.0 mm. longa.....80. *T. Arsenii*.
      g. Antherae 2.0–2.5 mm., carpella matura 5.5–7.5 mm. longa.....81. *T. jaliscanum*.
a. Planta scabra pubescens, nullo modo glauca....*h*.
  h. Foliolae per faciem supernam scabrae.....82. *T. cuernavacanum*.
  h. Foliolae glabrae superne..83. *T. cuernavacanum*, var. *supraglabrescens*.

75. T. **Treleasii,** sp. nov. *Planta* glabra circiter 6 dm. alta. *Folia* petiolata. *Foliolae* membranaceae per marginem fere totam crenatae, crenis 20 admodum. *Sepala* ca. 4 mm. *Stamina* 20–30 in floribus singulis. *Filamenta* 5–6 mm. *Antherae* 4.0–5.5 mm. *Acumen* antherae 0.5–0.7 mm. *Ovaria* 3–6 in flore. *Stylus* una cum stigmate 6–9 mm. *Fructum* auctor non cognoscit, consimilem *Thalictro Pringlei* tamen esse videtur. Floret Junio.—MEXICO, GUERRERO: *Langlassé 1061*, Sierra Madre, alt. 1000 m., juin 16, 1899 (G, TYPE; US, ISOTYPE). FIG. 75, a and b.

Dedicated to Prof. WILLIAM TRELEASE who in 1886 published a monographic paper on the genus as represented in America north of Mexico.

76. T. PELTATUM DC. Prod. **1:** 11, 1824, nec sensu J. N. Rose, Contrib. U. S. Nat. Herb. **5:** 186, 1899; nec *T. peltatum* Sessé & Moc., Fl. Mex. 134, 1894. *Planta* fere metralis, parum si vero glauca. *Foliolae* plus minusve coriaceae basi rotundae, ad apicem grosse dentatae vel crenatae, crenis vel dentibus 3–10 in foliola. *Sepala* 3.3–4.5 mm. longa. *Filamenta* 5–7 mm. *Antherae* 1.9–4.0 mm., acumina 2.0–6.5 mm. subaequantes. *Ovaria* 0–5 in flore, *stylo* una cum stigmate 8–13 mm. *Carpella* matura ignota, verosimiliter (ex immaturis) ca. 5.0 mm. longa, 2.0 mm. lata, semi-obovata, parum si vero stipitata, ista *Thalictri Pringlei* Wats. approximantia. Floret Augusto.—MEXICO, MEXICO: *Hinton 4547*, distr. of Temascaltepec, Nanchititla, oak woods, Aug. 18, 1933 (M, US); *Alaman*, [probably near Mexico city[1]], 1811 [or 1821?[1]] (TYPE in Delessert Herbarium; F, photograph of same). MICHOACAN: *Hinton 15,071*, distr. Barroloso, Coalcoman, woods, alt. 1300 m., Aug. 7, 1939 (G). FIG. 76, a–c.

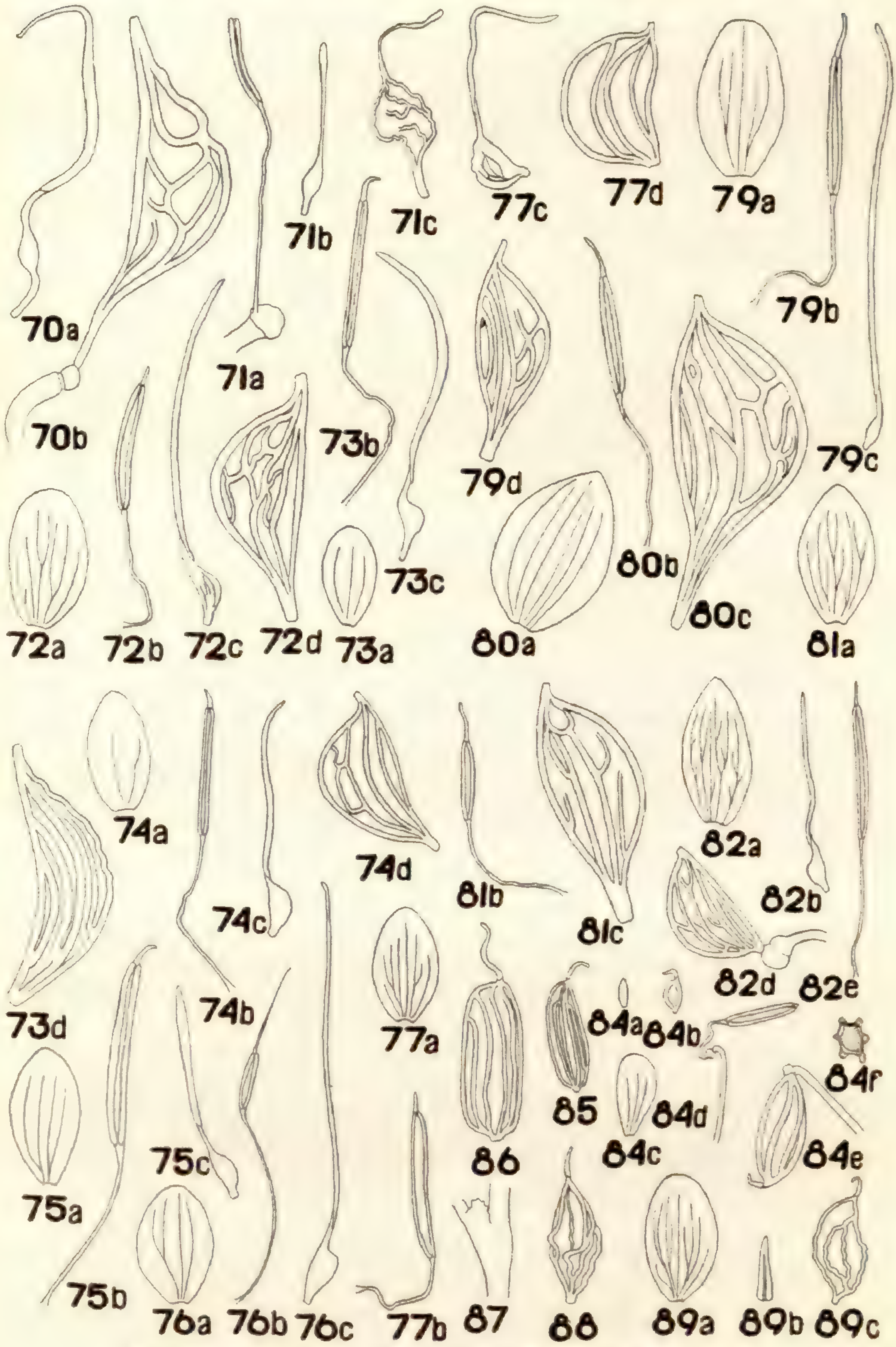
DeCandolle's original description applies well to all species of subsect. *Eupeltata.* In 1899, J. N. Rose (Contrib. U. S. Nat. Herb. **5:** 186) with the help of C. De Candolle solved the problem by comparing specimens from five different species with the actual type. Since *T. peltatum* DC. had been collected but once until as late as 1933, it is not surprising that the name was applied to its closest related species, for which we are now proposing the name *T. Roseanum.* But as we now have a very good photograph at hand it becomes possible even to take measurements of the actual type, e. g.: sepal 3.3 mm., acumen 2.3 mm., anther 1.9 mm., filament 5.1 mm., stigma 10.5–13.0 mm., fruit 5.0 x 2.1 mm., etc.

[1] Notes of the author.

77. T. Pringlei Wats. Proc. Am. Acad. **25:** 141, 1890. *Planta* glabra, saepius sub florendi tempus caeca, deinde saepius glauca cum fructus maturant, sub maturandi saepius lucida, posteaque lamina lucida exfoliatur, et planta pallida caeca revelatur. *Radix* fibrosa. *Folia* petiolata 2–4-ternata. *Foliolae* margine vel integra vel sinuata vel crenata vel grosse dentata, dentibus vel crenis 0–7 in foliola. *Sepala* 3.0–4.5 mm. longa. *Stamina* 30–50 in flore. *Filamenta* 3.0–3.5 mm. *Antherae* 3–4 mm., *acumine* 0.5–0.8 mm. *Stylus* una cum stigmate 6–9 mm. *Carpella* matura subsessilia semi-ovata, *nervis* simplicibus vel ramosis et anastomosantibus, nervo dorsali fere recto vel parum concavo. Floret Junio Julioque.—Mexico, nayarit: *M. E. Jones 22,843*, Tepic, Feb. 15, 1927 (F). mexico: *M. E. Jones 85*, La Palma. June 9, 1892 (UC, US); *Sarton*, Tolucca Mts., 1852 (US). michoacan: *Leavenworth & Hoogstraal 1823*, Tancitaro region, Apatzingan, common in open pine forest above Acahuato, sometimes in pure stands, alt. 3500–4000 ft., Aug. 23, 1941 (F); *Leavenworth 395*, Tancitaro on the road from Tancitaro to Apatzingan, here 2′–4′, common on rocky banks in pine woods from 4000–6000 ft., alt. 5000 ft., July 30, 1940 (F, M, NY); *Leavenworth & Hoogstraal 989*, Tancitaro, west of Santa Clara, gravelly bank near stream, open pine forest, alt. 6000 ft., July 11, 1941 (F, M). jalisco: *Pringle 2478*, slopes of the barranca near Guadalajara, June 29, 1889 (G, type; ANS, F, M, NY, UC, US, isotypes); *Pringle 2479*, hillsides near Guadalajara, slopes of the barranca of Guadalajara, alt. 5000 ft., July 16, 1902 (F, G, M, NY, US); *Rose & Hough 4824*, Guadalajara, in Barranca, July 9, 1899 (US); *Reke 4581*, Guadalajara, Barranca Ibarra, alt. 1400 m., Nov., 1922 (US); *Mexia 1412a*, Sierra Madre Mtns., San Sebastian, trail to Mascota, damp ravine in open pine forest, prominent on forest floor, alt. 1425 m., Jan. 7, 1927 (F, G, M, NY, UC). Fig. 77, a–d.

78. T. Pringlei Wats., var. reticulatum Rose, Contrib. U. S. Nat. Herb. **5:** 188, 1899. *Planta* 35–40 cm., pubescens nisi in pagina superna *foliolarum*. *Foliolae* vel crenatae, vel repandae, vel integrae, per ambas paginas rugosae *nervis* conspicue reticulatis.—Mexico, nayarit: *Rose 1985*, Territorio de Tepic, between Pedro Paulo and San Blascito, Aug. 6, 1897 (US, type; G, isotype); *Rose 1985a*, Territorio de Tepic, foothills between Pedro Paulo & San Blascito, Aug. 4, 1897 (US); *Rose 3372*, Territorio de Tepic, between Dolores & Santa Gertrudis, Aug. 7, 1897 (US).

The type of this variety was stored away and hence it has not been seen. With better flowering material and fully mature fruits, this variety might prove specifically different from the typical form.



DETAILS OF FLOWERS OR FRUITS OF THALICTRUM, all × 4.

(For explanation see end of paper.)

79. T. **Roseanum,** sp. nov. *T. peltatum* Sessé & Moc. Fl. Mex., **2:** 134, 1894 nec *T. peltatum* DC. Prod. **1:** 11, 1824. *Planta* glabra, saepius conspicue glauca, metralis vel altior. *Folia* biternata, sessilia in apice dilatationis stipularis. *Foliolae* majores orbiculares, ad apicem crenatae vel grosse dentatae. *Sepala* 5.0–5.5 mm. longa. *Antherae* 2.2–3.2 mm., *acumine* 1.0–1.5 mm. *Filamenta* 4–5 mm. *Stylus* una cum stigmate 6.5–9.0 mm. *Carpella* matura compressa 5.6–6.5 mm. longa, *stipite* 0.5–1.5 mm., ventro 4.2–4.5 mm. longo, 2.2–2.6 mm. lato, *nervis* nonnunquam parum ramosis anastomosantibusque, nervo dorsali convexo, ventrali convexiore quam dorsali. Floret Julio mense. An etiam Junioque?—MEXICO, MORELOS: *Pringle 7448*, bluffs of barranca above Cuernavaca, alt. 6500 ft., Aug. 23, 1897 (G, TYPE; M, US, ISOTYPES); *Pringle 8261*, bluffs of mountain canyon above Cuernavaca, alt. 6500 ft., Sept. 30, 1899 (ANS, F, G, M, NY, UC, US); *Pringle 7205*, bluffs of barranca near Cuernavaca, alt. 6000 ft., Jul. 28, 1896 (G, US). FIG. 79, a–d.

Dedicated to the late JOSEPH NELSON ROSE who laid the foundations for our understanding of the Mexican species of *Thalictrum*.

T. peltatum Sessé & Moc. is a heterogeneous species as can be easily seen by what is preserved of it at the Field Museum. However the description seems mainly based on *T. Roseanum*. The fragments can not be identified with certainty.

80. T. **Arsenii,** sp. nov. *Planta* glabra saepius valde glaucescens. *Folia* 2–4-ternata, sessilia in apice dilatationis stipularis. *Foliolae* ovatae majusculae nonnunquam ad decimetrum diametro attingentes, saepius tamen circiter semidecimetrales, ad apicem grosse dentatae vel crenatae. *Sepala* 4.5–5.0 mm. longa. *Stamina* 25–30 in flore. *Antherae* 3.0–4.5 mm., *acumine* 1.2–2.0 mm. *Filamenta* 5–6 mm. *Stylus* una cum stigmate ca. 7.5 mm. *Carpella* matura compressa, ad *stipitis* apicem parum recurvata, 8.5–10.0 mm. longa, ventro 5.0–6.5 mm. longo, ca. 3.5 mm. lato, *nervis* aliquando simplicibus, saepius tamen ramosis anastomosantibusque, nervo dorsali convexo, ventrali convexiore quam dorsali. Floret sub menses Julii et Augusti.—MEXICO, MICHOACAN: *Arsène*, vicinity of Morelia, Jaripeio, alt. 2100 m., Jul. 13, 1911 (M, US); *Arsène*, près Morelia, Coronilla, 19 sept., 1909 (NY); *Arsène 2490*, vicinity of Morelia, Coronilla, en face de la prise d'eau, alt. 2000 m., 19 sept., 1909 (US); *Arsène 5470*, vicinity of Morelia, Rincòn, alt. 2000 m., 14 août, 1910 (G, TYPE; M, NY, US, ISOTYPES); *Kenoyer A-482*, Morelia, Aug. 17, 1938 (M); idem, Aug. 18 (F); *Arsène 8*, Morelia, talus, 8 juin, 1910 (CA); *Arsène 13*, Morelia, Rincòn, alt. 2000 m., 14 août, 1909 (F). FIG. 80, a–c.

Dedicated to Brother G. ARSÈNE, an enthusiastic field-botanist. His Mexican collections are both abundant and well preserved and form a high percentage of the herbarium material at hand for study.

81. T. JALISCANUM Rose, Contrib. U. S. Nat. Herb. **5**: 187, 1899. *Planta* glabra saepius valde glaucescentia, sesquimetralis usque bimetralis. *Folia* 2–6-ternata. *Fiololae* orbiculares vel obovales, ad apicem crenatae vel grosse dentatae. *Sepala* 3.0–3.5 mm. longa. *Stamina* ca. 30 in flore. *Antherae* 2.2–2.5 mm., *acumine* 1.2–1.7 mm. *Carpella* matura compressa, 5.5–7.5 mm. longa, ventre 5.0–5.5 mm. longo, 2.0–2.5 mm. lato, *stipite* 0–1.5 mm. longo, *nervis* ramosis anastomosantibusque, nervo dorsali convexo, ventrali convexiore quam dorsali.—MEXICO, MEXICO: *Hinton 4259*, Temascaltepec, Telpintla, alt. 1840 m., July 28, 1933 (G, NY); *Hinton et al. 6557*, Temascaltepec, Rincon del Carmen, edge of oak woods, 1.5 m. high, Sept. 6, 1934 (G, NY, US); *Hinton 1078*, Temascaltepec, Volcan, rolling prairie, 2 m. high, alt. 1410 m., July 18, 1932 (F); *Hinton 6740*, Temascaltepec, Platanal, hill, 1.5 m. high, Oct. 11, 1934 (NY). JALISCO: *Rose & Hough 4785*, near Tequila, July 5 and 6, 1899 (US); *Goldsmith 28*, east of Volcano Colima, wooded hills, alt. 5000 ft., July 13, 1905 (G); *Rose & Painter 7519*, near Etzatlan, Oct. 2, 1903 (NY, US); *Rose & Painter 7643*, near Chapala, Oct. 5, 1903 (US); *Diquet* (NY): *Mr. & Mrs. J. G. Lemmon 157*, lake Chapala, 1905 (F, G, UC). FIG. 81, a–c.

The type (*Rose 2840*) has not been seen but the original description is clear enough. One label states that the plant is 3.4 m. high. Such a height is not impossible, but the way the number presents itself suggests the possibility of an error.

82. T. CUERNAVACANUM Rose, Contrib. U. S. Nat. Herb. **5**: 187, 1899. *Planta* omnino scabra, 7–12 decimetrorum, nullo modo glauca. *Folia* 2–3-ternata, petiolata, dilatatione petiolari reducta. *Foliolae* orbiculares, per marginem fere totam crenatae. *Stamina* ca. 30 in flore. *Antherae* 2.5–5.0 mm., *acumine* 0.7–1.2 mm. *Filamenta* 4.0–5.5 mm. *Stylus* una cum stigmate 4–9 mm. *Carpella* matura compressa 3–5 mm. longa, 1.5–2.8 mm. lata, *stipite* 0–0.5 mm., *nervis* simplicibus vel parum ramosis anastomosantibusque, nervo dorsali recto vel paululum convexo. Floret Junio et Julio.—MEXICO, MORELOS: *Rose 6860*, near Cuernavaca, Sept. 8, 1903 (NY, US); *Pringle 7238*, near Cuernavaca, rocky bluffs of barranca, alt. 5000 ft., July 26, 1896 (US, TYPE; F, G, M, ISOTYPES); *Pringle 6878*, above Cuernavaca, lava fields, alt. 7000 ft., June 27, 1898 (ANS, F, G, M, NY, UC, US, paratypes). FIG. 82, a–d.

Type not seen, but there is an abundance of isotypes and paratypes at hand.

83. T. CUERNAVACANUM Rose, var. **supraglabrescens,** var. nov., Morton in litt. *Foliolis* supra glabris nec scabris.—MEXICO, GUERRERO: *Rusby 153,* Limon Mtn., alt. 4000 ft., July 28, 1910 (US, TYPE and ISOTYPE; NY, ISOTYPES); *Lyonnet 304,* Taxco, julio, 1929 (US); *Kenoyer A-481,* Taxco, July 20, 1938 (F).

Sectio **Heterogamia,** sect. nov. Sect. *Thalictrum,* 1. *Heterogama* DC., Syst., **1:** 172, 1817. *Plantae* glabrae vel pubescentes. Pubescentia, cum adest, pilorum capitatorum translucidorum. *Flores* dioici. *Sepala* dimorpha, floris masculi majora saepius colorata, foeminei minora viridia vel raro purpurascentia. *Filamenta* imprimis lutea deinde nonnunquam purpurascentia, nec clavata sed filiformia et sub antheris paullulum dilatata. *Stigma* plus minusve bialatum. Species typica *Thalictrum dioicum* L. sit.

Group confined to Mexico, United States, Canada and the French Islands of St.-Pierre et Miquelon.

Subsectio **Debilia,** subsect. nov. *Plantae* glabrae, *foliis* ternatisectis, *radicibus* tuberosis fusiformibus haud stoloniferae. *Caulis* basis decumbens. *Folia* inferiora desunt nisi reducta velis vaginis, intermedia plurima conferta, superiora pauca sparsa, inflorescentiae minora. *Stipellulae* desunt. *Inflorescentia* elongata pauciflora paniculata. *Carpella* matura subsessilia recta haud compressa, ventre symetrico pariete membranaceo, *nervis* simplicibus convexis nec sinuosis. Species typica *Thalictrum debile* Buckley sit.

a. Carpella matura ovoidea; stigma 0.5–1.0 mm. Planta rigida radicibus nigris ..... 84. *T. texanum.*
a. Stigma 1.3–3.0 mm. Plantae decumbentes radicibus brunneis ....*b.*
b. Carpella matura elliptico-lanceolata, 0.7–1.2 mm. lata .... 85. *T. debile.*
b. Carpella matura ellipsoidea, 1.5–2.0 mm. lata ..... 86. *T. arkansanum.*

84. T. TEXANUM (Gray) Small, Fl. Se. U. S. 446, 1903. *T. debile* Buckley, var. *texanum* Gray ex E. Hall, Pl. Tex. 3, 1873, nomen nudum; Gray, Syn. Fl. N. Am. **1:** 18, 1895. *Planta* rigida 10–45 cm. *Radices* nigricantes, cum siccatae, haud costatae sed irregulares. *Sepala* floris maris 1.7–3.0 mm., foeminei 0.7–1.5 mm. longa. *Filamenta* ca. 1.5 mm. *Antherae* 1.4–2.0 mm. *Stigma* 0.5–1.0 mm. *Carpella* matura ovoidea, stipite 0.1–0.3 mm., ventre 2.7–3.7 mm. longo, 1.4–1.6 mm. lato, apice acuto, basi rotundo, *nervis* 6–8 in fructu. Verosimiliter floret Februario et Martio.—TEXAS: *Wright 170,* Fayette Co., Cumming's Creek, May 10, 1849 (ANS, G); *Hall,* Houston, April, 1872 (F, paratype); *Hall 3,* Houston, moist prairies,

March 28, 1872 (G, TYPE; ANS, F, M, NY, US, ISOTYPES). FIG. 84, a–f.

85. T. DEBILE Buckley, Amer. Journ. Sci. **45:** 175, 1843. *Planta* innitens, 10–40 cm. *Radices* brunneae, cum siccatae, costatae. *Sepala* floris maris obovata, ca. 1.7–2.0 mm., foeminei saepius lanceolata, ca. 1.0 mm. *Filamenta* ca. 2.0 mm. *Antherae* 1.7–2.0 mm., *acumine* 0.1–0.3 mm. *Stigmata* 1.3–2.0 mm. *Carpella* matura oblongo-lanceolata, *stipite* ca. 0.1 mm., ventre per ambas apices rotundo 3.0–3.7 mm. longo, 0.7–1.2 mm. lato, *nervis* 8–10 in fructu. Floret Aprili.—GEORGIA: *Chapman*, Rome, 1882 (F, G, US); *Chapman*, Mts. of Georgia (M, US). ALABAMA: *Nieuwland*, Blount Co., Warnock Peak, April 12, 1930 (N-ND); *Buckley*, Wilcox Co., woods, rich alluvial soil, procumbent, April, 1840 (NY, US, paratypes); *Buckley* (ANS, G, paratypes); *Buckley*, April (M, paratype); *Buckley*, Wilcox Co., near Allenton, rich woods, April, 1842 (M, TYPE); *Buckley*, April, 1841 (M, NY, paratypes). FIG. 85.

86. T. **arkansanum,** sp. nov. *Planta* erecta 20–40 cm. *Radices* brunneae nonnunquam, cum siccatae, costatae. *Sepala* floris maris ovata vel elliptica 2.0–3.0 mm. longa, foeminei ovata 1.0–1.5 mm. longa. *Filamenta* 2.0–3.0 mm. *Antherae* 1.8–2.3 mm., acumine 0.1–0.4 mm. *Stigma* (1.5)–2.3–3.0 mm. *Carpella* matura sessilia ventro ellipsoideo 3.5–4.5 mm. longo, 1.5–2.0 mm. lato, *nervis* 10–12 in fructu. Floret Aprili et Majo.—ARKANSAS: *Canby, Sargent, Trelease & Bush*, Fulton, rich woods, Apr. 18, 1901 (ANS); *Bush 2445*, Fulton, low ground, Apr. 26, 1905 (M, TYPE); *E. J. Palmer 9403*, Hempstead Co., Fulton, upland open woods, Apr. 8, 1916 (ANS, US); *E. J. Palmer 7151*, Fulton, upland woods, Apr. 5, 1915 (NY, US); *J. C. Kellogg*, Arkansas Post, March 14, 1909 (M); *Bush 511*, Fulton, common in low ground, Apr. 4, 1900 (G, M, US); *Nuttall* (ANS); *Bush 2271*, Texarkana, low rich woods, Apr. 8, 1905 (M). FIG. 86.

Subsectio **Sinuosa,** subsect. nov. *Plantae* glabrae, raro paululum pubescentes pilis capitatis. *Radices* tuberosae. *Folia* sparsa foliolis parvis. *Stigma* sagittatum. *Carpella* matura recta basi rotunda, apice acuta, *nervis* simplicibus sinuosissimis et crassiusculis, nec costata. Species typica *Thalictrum pinnatum* Wats. sit.

a. **Folia ternata vel raro subpinnata . . . .** *b.*
  b. **Caulis basis procumbens aphyllus, folia ternata . . . . . 87. *T. pudicum.***
  b. **Caulis rigidus erectus, folia 2–3-ternata vel subpinnata, licet folia ramorum ternata . . . .** *c.*
    c. **Caulis a basi ramosus, ramis foliosioribus, foliis 2-ternatis 88. *T. madrense.***
    c. **Caulis foliis caulinariis 3-ternatis vel subpinnatis, ramorum plurimis vel omnibus aphyllis 90. *T. pinnatum*, var. *subternatum.***
a. **Folia pinnata, pinnis ternatis . . . . . 89. *T. pinnatum.***

87. T. **pudicum** Standley & Boivin, sp. nov. *Planta* glabra, 5–25 cm., ramosa, *ramis* foliosis. *Caulis* gracilis erectus nisi basis procumbens. *Folia* ternata et fere omnia sessilia. Inferiora desunt vel *stipulae* istorum adsunt, quae stipulae oppositae lanceolatae et 2–4 mm. longae sunt. *Stipulae* foliorum fere omnes auriculatae et erosae. *Pedunculi* 2.5–5.0 cm. Flores singulae in ramis singulis. *Sepala* floris maris viridia ovata ca. 3.5 mm. longa. *Filamenta* ca. 5 mm. *Antherae* ca. 3.5 mm., *acumine* ca. 0.5 mm. Planta foeminea ignota. Floret Julio.—MEXICO, MICHOACAN: *Leavenworth, & Hoogstraal 1013*, 2 mi. so. of Tancitaro, edge of pedregal, along edge of canyon in moist soil, open situation, less than 1 ft. high, alt. 6000 ft., July 19, 1941 (F, TYPE; M, ISOTYPE). FIG. 87.

88. T. MADRENSE Rose, Contrib. U. S. Nat. Herb. **5:** 188, 1899. *Planta* glabra ramosa rigida 20–30 cm., *ramis* foliosis. *Ovaria* tamen interdum puberula, pilis capitatis translucidis minutissimis. *Folia* ramorum 1–2-ternata cetera 2-(3)-ternata. *Stipulae* integrae. *Pedunculi* 1.5–3.0 cm. *Flores* in paniculis angustis caulem et ramos definientes. *Sepala* foeminei lanceolata 1–2 mm. longa. *Stigma* 1.0–1.5 mm. *Carpella* matura ventre 3–4 mm. longo et 1.5–1.8 mm. lato. Planta mascula et tempus florendi ignota.—MEXICO, DURANGO: *Rose 3505*, Sierra Madre, alt. 5200 ft., Aug. 15, 1897 (US, paratype). NAYARIT: *Rose 2232*, Territorio de Tepic, in the Sierra Madre, near Santa Teresa, Aug. 13, 1897 (US, TYPE; G, ISOTYPE). FIG. 88.

Type not seen.

89. T. PINNATUM Watson, Proc. Am. Acad. **23:** 267, 1888. *Planta* erecta rigida glabra, 2–8 dm. alta. *Radices* tuberosae. *Folia* caulinaria pinnata, pinnis ternatis vel simplicibus raro pinnatis. *Stipulae* integrae. *Foliolae* parvae, basae cuneatae, apicales saepius trifidae. *Sepala* floris maris elliptica, 3.5–6.0 mm. longa, foeminei lanceolata vel linearia 1–2 mm. longa. *Filamenta* 3–4 mm. *Antherae* 2.5–4.5 mm., *acumine* 0.3–0.7 mm. *Stigma* 0.6–1.5 mm. *Carpella* matura 3.5–5.0 mm. longa, *stipite* 0.2–0.4 mm., ventre 2.5–3.0 mm. longo et 1.5–1.7 mm. lato, *nervo* dorsali irregulariter convexo, ventrali convexiore. Floret Junio Julioque.—MEXICO, CHIHUAHUA: *LeSueur 1059*, Culebra Mts., Aug. 18, 1936 (F, G); *S. S. White 2255*, 4 miles northwest Chihuahua, Majalca (Pilares), alt. 6800 ft., Aug. 11, 1939 (G); *M. E. Jones*, Sierra Madre Mts., Soldier Canyon, alt. 6600 ft., Sept. 16, 1903 (CA, UC); *Townsend & Barber 134*, in the Sierra Madres, near Colonia Garcia, alt. 7500 ft., July 15, 1899 (F, G, M, NY, UC, US); idem *110*, July 6 (F, M, NY, US); *Shreve 9050*, summit of Santa Clara Mts., in pine forest, alt. 7100 ft., Aug. 13, 1939 (G); *Pringle 1563*, Sierra Madre, alt. 7000–8000 ft., Oct., 1888 (UC); *Pringle 1887*, base of the Sierra

Madre, pine plains, Sept. 20, 1887 (G, TYPE; ANS, F, NY, US, ISOTYPES); *Nelson 6037*, in the Sierra Madre, June–July, 1899 (NY, US); *Shreve 7997*, 6 mi. w. of C. Guerrero, in open oak and pine forest, alt. 7100 ft., July 25, 1937 (F); *Knobloch 5256*, San Juanito, July 20, 1938 (F); *Hartman 772*, near canyon de St. Diego, moist places on high mountains, "Culantrio", Sept. 17, 1891 (G, US). SONORA: *Pennell 19,611*, Cerro Saguarivo, east of San Bernardo, on rocks, alt. 1500–1600 m., Aug. 7–8, 1935 (ANS); *Schott 3*, Sierra del Najarito, June 28, 1855 (F). DURANGO: *E. Palmer 381*, Otinapa, July 25–Aug. 5, 1906 (F, G, M, NY, UC, US); *Garcia 341* (US); *Nelson 4541*, near El Salto, alt. 8000–8700 ft., July 12, 1898 (US); *Pennell 18,324*, El Salto, dry open pineland, herb, alt. 2570–2600 m., Aug. 28, 1934 (ANS). FIG. 89, a–c.

90. T. PINNATUM Wats., var. **subternatum** var. nov. A varietate typica differt *foliis* caulinariis subternatis vel etiam ternatis foliolisque membranaceis. *Planta* humilior est, 1–4 dm. alta, et crescit in locis humidosioribus. Floret Julii mense.—MEXICO, CHIHUAHUA: *Gentry 1526*, Sierra Charuco, Rio Fuerte, transition, herb scattered along rocks in spring in meadow, July 25, 1935 (F, TYPE; ANS, G, M, UC, US, ISOTYPES); *LeSueur 1211*, Chuichupa, Aug., 1936 (G). DURANGO: *Pennell 18,378*, El Salto, edge of marsh, herb, alt. 2530–2540 m., Aug. 28, 1934 (ANS).

Subsectio **Dioica** (Prantl), stat. nov. Sect. *Camptogastrum*, E. *Dioica* Prantl, Nat. Pfl. **3,** 2: 66, 1888. *Plantae* glabrae. *Radices* fibrosae. *Caulis* erectus rigidus. *Stipulae* integrae. *Stipellulae* desunt. *Petioli* articulati in insertione. *Carpella* matura sessilia inflata, ventre symmetrico nec compresso, pariete firmo, *nervis* simplicibus et directis. Species typica: *Thalictrum dioicum* L. ut patet e Prantl.

This group is made up of only one very distinct and little variable species.

91. T. DIOICUM L., Sp. Pl. **1:** 545, 1753. *T. laevigatum* Michx. Fl. Bor.-Am. **1:** 322, 1803. *T. pauciflorum* Rafinesque, Atl. Journ. **1:** 151, 1832, nec *T. pauciflorum* Royle, Ill. Bot. Him. 52, 1839, nec *T. pauciflorum* Schur, Verh. Sieb. Ver. Nat. **3:** 84, 1852, nec *T. pauciflorum* Steph. ex Lec., Bull. Soc. Bot. Belg. **24:** 302, 1885. *T. dioicum* L., var. *genuinum* Lec., Bull. Soc. Bot. Belg. **24:** 142, 1885. *T. pulchellum* Pursh ex Lec., Bull. Soc. Bot. Belg. **24:** 307, 1885, nomen nudum. *T. dioicum* L., var. *adiantinum* Greene, Ott. Nat. **23:** 39, 1909. *T. dioicum* L., var. *huronense* Greene, l. c. 1909. *T. dioicum*, L. var. *Langfordii* Greene, l. c. 40, 1909. *Leucocoma dioica* (L.) Nieuwland, Amer. Midl. Nat. **3:** 324, 1914.—*Planta* omnino glabra erecta rigida, 3–8 dm. *Radices* fibrosae. *Folia* supraternatisecta, basilaria

0–3 in planta, caulinaria 0–1, inflorescentiae plurima. Folium inferius inflorescentiae petiolo 3–8 cm. *Sepala* floris maris ovata vel elliptica 2.5–4.0 mm. longa, foeminei ovata vel obovata 1.8–2.2 mm. longa. *Filamenta* lutea 3.5–5.5 mm. *Antherae* luteae oblongo-lanceolatae vel lineares 1.4–4.0 mm. longae, *acumine* 0–0.2 mm. *Stigma* 1.0–2.5 mm. *Carpella* matura 4–5 mm. longa, *stipite* 0.3–0.4 mm., ventre ovoideo vel ellipsoideo 3.4–4.3 mm. longo, 1.5–1.8 mm. lato. *Nervi* carpellorum maturorum parum a costis distincti, pariter arcuantes vel interdum nervus ventralis quam dorsali convexior. Floret Aprili, Majo, Junio, Julioque.—"Canada": *Kalm* (Linnean Society Lond., type of *T. dioicum;* G, photograph). United States (without localization): *Michaux*, in Pensylvania et montibus Carolinae (Paris, National Museum, type of *T. laevigatum;* G, photograph). Saint-Pierre et Miquelon: *L. Arsène 238*, Saint-Pierre, marécages de la ferme Maillard, lieux herbeux et humides, 8 juillet, 1902 (NY); *L. Arsène 263*, Saint-Pierre, anse à Ravenel, lieux herbeux et humides, bois, 8 et 20 juillet, 1900 (G). Québec: *Peers*, Montreal, Mt. Royal, May 11, 1941 (CA); *C. H. Knowlton*, Missisquoi, Philipsburg, dry calcareous woods, Aug. 10–11, 1923 (G); *Macoun & Malte 88,011*, Hull, north end of Fairy Lake, May 9, 1913 (C). Maine: *Fernald*, Penobscot Co., Orono, rocky woods, May 19, 1890 (NE); *C. A. E. Long 858*, Knox Co., Rockland, rocky bank, May 2, 1921 (NE); *Fernald 13,636*, Kennebec Co., Vassalboro, brooksides and gullies in clay terraces, July 6, 1916 (NE); *Furbish*, Cumberland Co., Brunswick, 1880 (NE). New Hampshire: *Beetle 331*, Grafton Co., Hanover, May 16, 1936 (NE); *Rand & Robinson 458*, Cheshire Co., Troy, Gap Mt., rocky woods, June 13, 1898 (G, NE). Vermont: *C. H. Knowlton*, Orange Co., Newbury, slaty woods, May 17, 1932 (NE); *E. E. Phelps*, Windsor Co., Windsor (NE); *E. F. Williams*, Rutland Co., Brandon, May 21, 1908 (G, NE); *Fernald, Harris, Drew et al.*, Bennington Co., Manchester, Mount Equinox, rich woods, May 21, 1932 (NE). Massachusetts: *Morong*, Hamilton, damp places among rocks, May & June 1875 (F, paratype of *T. dioicum* var. *Langfordii*); *A. W. Cheever*, Plymouth Co., Hingham, June 22, 1924 (NE); *Bean & Schweinfurth 16,071*, Worcester Co., Charlton, woods, May 20, 1916 (NE); *C. H. Knowlton*, Franklin Co., Greenfield, moist alluvial terrace, May 12, 1912 (NE); *Forbes & Wheeler*, Hampshire Co., Mt. Tom, ledges near base, Holyoke diabase, May 17, 1903 (NE); *St. John & White 168*, Hampden Co., Russell, sandy bank, sericite schist (Savoy Schist), May 17, 1913 (NE); *Knowlton & Schweinfurth*, Berkshire Co., Mount Washington, dry open woods, May 30, 1919 (NE); *G. Gilbert*, Newton, Pine Grove, May 6, 1894 (G). Rhode Island: *Leland*, Johnston Co., Snake Den, May 13, 1899 (NE);

M. B. Simmons, Newport Co., Middletown (NE). CONNECTICUT: *Woodward*, New London Co., Rachel's Hut, rocky woods, May 27, 1905 (NE); *P. Spalding*, Hartford Co., East Granby, May, 1920 (NE); *Safford*, New Haven Co., New Haven, East Rock, June 2, 1884 (US). NEW YORK: *O. P. Phelps 460 & 461*, Canton, woods, May 19, 1914 (G); *Burnham*, Washington Co., ½ mile east of Tripoli schoolhouse, rocky copse, May 13, 1914 (G); *McVaugh 4107*, Columbia Co., Ghent, moist rocky banks, May 1, 1936 (G); *Raup 8105*, Orange Co., Black Rock Forest, ravine of Canterbury Brook, May 18, 1937 (G); *Eames & Metcalf 2301*, Tompkins Co., Ithaca, gravelly soil, side of gully, May 7, 1904 (G); *E. B. Bartram*, Monroe Co., Rochester, moist woods, May 15, 1910 (G); *Peck*, St. Lawrence Co., Rossie, June 10, 1909 (US). NEW JERSEY: *Carey*, Bergen, ravine, May 24, 1842 (G); *Fogg 12,313*, Somerset Co., Sourland Mts., about 4 m. n. w. of Blawenburg, July 7, 1937 (G); *B. Long 39,983*, Hunterdon Co., Treasure Island, steep wooded bank along Delaware River, May 21, 1933 (G). PENNSYLVANIA: *Fogg 6502*, Delaware Co., n. of Swarthmore, wooded hillslope along creek, May 17, 1934 (G); *Heller*, Lancaster Co., on the Conestoga near Binkley's Bridge, in limestone, May 4, 1901 (G); *Galen 24*, Lancaster Co., April–May, 1885 (G); *Wahl 643*, Elk Co., 3 mi. W. of Caledonia, gravelly roadside, June 2, 1940 (G); *Fender 1500*, Union Co., 2 m. se. of Lewisburg, along West Branch of Susquehanna River, June 15, 1936 (G); *E. B. Bartram*, Chester Co., Frazer, April 23 & 30, 1910 (G); *Fogg 14,473*, Bradford Co., 1.5 mi. n.-nw. of Wyalusing, along Susquehanna River, wooded crest of cliffs, June 8, 1938 (G). DISTRICT OF COLUMBIA: *T. A. Williams*, Rock Creek, May 1, 1898 (G). WEST VIRGINIA: *Eggleston 4344*, White Sulphur Springs, May 17–18, 1909 (G). VIRGINIA: *Small*, Smyth Co., E. Marion, on Stalie's Knob and Stalie's Creek, alt. 2400 ft., May 18–19, 1892 (M); *Hunnewell*, Bath Co., Hot Springs, woods, May 11, 1916 (G); *A. H. Curtiss*, Bedford Co., April 15, 1871 (G); *Fogg 14,589*, Giles Co., 2¼ mi. ne. of Mountain Lake P. P., Salt Pond Mt., alt. 3800 ft., June 22, 1938 (G); *Churchill*, Rockbridge Co., Goshen, rocky woods, April 28, 1915 (M). NORTH CAROLINA: *Ashe*, Mitchell Co., Frank P. O., May 11, 1893 (NC); *Peattie 1667*, Polk Co., Tryon, in cool mountain woods, April 20, 1922 (NC); *Barksdale*, Bat Cave Mountain, April 19, 1937 (NC). SOUTH CAROLINA: *House 2064*, Oconee Co., Tamassee Falls, May 5, 1906 (M); *House 1855*, Oconee Co., Clemson College, near Seneca River, low woods, April 16, 1906 (M). GEORGIA: *Leeds 2012*, Union Co., 1 mile n. of Frogtown Gap on branch of Helton Creek, June 1, 1934 (ANS); *Churchill*, Lookout Mountain, near the line between Tennessee and Georgia, April 19, 1906 (G). ONTARIO: *J. Macoun 33,609*, Niagara, May 9, 1901 (C, G); *T. M. C. Taylor*

et al. 2277, Algoma District, Carp River, mixed woods, bottomlands, July 15, 1935 (C); *J. Macoun 72,515*, near St. Thomas, woods, June 24, 1907 (C, type of *T. dioicum* var. *adiantinum*); *J. Macoun 33,608*, Lake Huron, Pt. Edward, June 12, 1901 (G, NY). Michigan: *Greenman 3356*, Sawyer Beach, Hemlock Dune, May 5, 1912 (G). Ohio: *Clavenger*, Columbus, June, 1903 (US); *Gleason*, north of Columbus, rich wooded hillsides, May 13, 1905 (G); *Webb 496 & 497*, Portage Co., Nelson Ledge, May 3, 1902 (G). Indiana: *Deam 15,851*, Noble Co., about 4 mi. northwest of Kendallville, in woods, June 6, 1915 (G). Kentucky: *Demaree 11,252*, Greenup Co., South Portsmouth, fertile river-hillsides, April 21, 1935 (M); *W. A. Anderson 407*, Fayette Co., Elklick, March 26, 1927 (G); *Blumer 238*, Louisville, River Road, woods, April 2, 1933 (G); *W. A. Anderson 9*, Henderson Co., Robard, April, 1923 (G). Tennessee: *Ruth 383*, Knoxville, Tennessee River, bluffs, May 20, 1894 (G); *Ruth*, Knoxville, rocky woods, April, 1896 (M); *Eyles 7713*, Obion Co., near Walnut Log, bluff, April 25, 1941 (G). Alabama: *Mohr*, Huntsville, Mount Sano, in sylvis umbrosis, May 8, 1881 (F); *Mohr 66*, near Huntsville, Mount Sano, upper districts, rich woods, May 1, 1881 (US); *Harper 3340*, Jackson Co., southeast of Scottsboro, northwest slope of Sand Mountain, among limestone rocks in woods, April 17, 1935 (G, NY, US). Illinois: *Pease 11,831*, Champaign Co., Urbana, moist bank near Crystal Lake, April 27, 1909 (G); *Gleason 527*, Urbana, hillside, April 28, 1899 (G). Minnesota: *Pammel 204*, Cass Lake, abundant in pine woods with Hard Maple and Basswood, July 28, 1925 (G); *M. L. Grant 2703*, Clearwater Co., Itasca Park, near campus, woods, sand, July 9, 1929 (G); *Sandberg 1148*, Itaska Lake, along stream, July 6, 1891 (US). Iowa: *Pammel*, Ames, College Park, May 28, 1927 (ANS); *Fink*, Fayette, prairies, 1894 (G); *Fink*, 1894 (US); *Fink 56*, Fayette Co., May 15, 1894 (US). Missouri: *Steyermark 11,569*, Wayne Co., west of Grenville, along St. Francis River, July 9, 1936 (M); *Steyermark 11,220*, Barry Co., south of Shell Knob, Smith Pond, wooded lime slopes, April 26, 1936 (M); *E. J. Palmer 35,966*, Benton Co., Fredonia, rich woods along bluffs of Osage River, May 22, 1929 (G); *E. J. Palmer 22,826*, Stone Co., Galena, limestone bluffs of the James River, rich woods, May 27, 1923 (M); *Bush 753*, Jackson Co., Courtney, May 2, 1896 (M, US); *Bush 98*, Sheffield, common on rocky hill, May 12, 1898 (G, M, US).

Specimens collected in July at Saint-Pierre are in flower, while in Georgia and Alabama this species matures its fruits in May or June. No specimens were seen either from eastern Québec or from the Maritime Provinces. We do not know if there is any type in existence of *T. pauciflorum* Raf.

Subsectio **Incurvata** subsect. nov. *Plantae* stoloniferae glabrae vel pubescentes. *Pubescentia* si adest e pilis capitatis minutis translucidis. *Folia* supraternatisecta. *Inflorescentia* aphylla vel, parum si foliosa foliis sessilibus, paniculata, apice acuta. *Flores* dioici, rarissime polygami. *Sepala* dimorpha, floris masculi majora. *Filamenta* colorata. *Carpella* matura subsessilia costata apice incurvata, *nervo* dorsali convexiore quam ventrali, pariete saepius incrassato. Nervi carpellorum costis parum distincti. Species typica *Thalictrum venulosum* Trel. sit.

a. Carpella matura haud compressa....*b.*
  b. Stigma (1.0–) 1.5–2.0 (–2.5) mm., venter carpelli maturi 3–4 mm. longus, 1.8–2.4 mm. latus.....92. *T. venulosum.*
  b. Stigma (2.0–) 2.5–4.0 (–5.0) mm., venter carpelli maturi 4–6 mm. longus....*c.*
    c. Venter carpelli maturi 2.5–2.7 mm. latus.....93. *T. confine.*
    c. Venter carpelli maturi 2.0–2.3 mm. latus. 94. *T. confine,* var. *Greeneanum.*
a. Carpella matura paullum compressa....95. *T. confine,* var. *columbianum.*

92. T. VENULOSUM Trelease, Proc. Bost. Soc. Nat. Hist. **23:** 302, 1886. *T. campestre* Greene, Erythrea, **4:** 123, 1896. *T. Lunellii* Greene, Midl. Nat. **1:** 102, 1909. *T. thyrsoideum* Greene, Midl. Nat. l. c. 1909. *T. thyrsoideum sylvanum* Lunell, Amer. Midl. Nat. **2:** 157, 1912. *Leucocoma Lunellii* (Greene) Lunell, l. c. **4:** 361, 1916. *L. thyrsoidea* (Greene) Lunell, l. c. 361, 1916. *L. thyrsoidea sylvana* (Lunell) Lunell, l. c. 361, 1916. *Planta* 20–75 cm. *Folia* basilaria 1–2, caulinaria 1–3 in planta. Pedunculi fructuum 0.3–1.5 cm., conspicue ascendentes vel appressi, saepius gemini. *Sepala* floris masculi 3.5–4.0 mm. longa, foeminei ca. 2 mm. *Filamenta* 3–4 mm. *Antherae* (2.0)–2.5–3.5 mm., *acumine* ca. 0.1 mm. *Stigma* (1.0)–1.5–2.0–(2.5) mm. *Carpella* matura stipite 0–0.3 mm., ventre 3–4 mm. longo et 1.8–2.4 mm. lato. Floret Majo, Junio, Julioque.—NORTHWEST AMERICA: *Franklin Expedition* (G, TYPE of *T. venulosum*); *Richardson 207* (G, paratype). QUÉBEC: *D. Potter 380,* James Bay, mouth of the Abitibi River, bank opposite Allen Island, June 30, 1929 (G); *Roy,* comté de Labelle, Bellerive, 9 juin 1935 (G). ONTARIO: *C. S. Williamson 2028 & 2032,* vicinity of Fort Williams, Kaministiqua, Aug. 2, 1912 (ANS); *D. Potter 379,* James Bay, Charlton Island, 3 miles N. W. of Hudson Bay Co.'s Post, sand along fresh-water creek, July 6, 1929 (G). WISCONSIN: *Griscom,* Sawyer Co., R. R. right of way north of Hayward, June 11, 1928 (G). MANITOBA: *E. L. Greene,* near Carberry, prairies, 1890 (G-ND, type of *T. campestre;* G, photo of type; NY, isotypes); *Scamman 2892,* Riding Mountain National Park, Clear Lake, alt. 2016 ft., Aug. 29–Sept. 2, 1941 (G); *Macoun & Herriot 69,804,* 6 mi. east of Forest, June 19, 1906 (G); *Herriot*

69,803, Portage La Prairie, May 31, 1906 (G). Minnesota: *Chandonnet*, Ottertail Co., Ottertail Lake, prairies, June 8, 1910 (N-ND). North Dakota: *Stevens 177*, Cass Co., Fargo, open places in woods, June 30, 1936 (G, F); *Lunell*, Benson Co., peninsula of Lake Ibsen, in woodlands, May 30, 1910 (NY, syntype of *T. thyrsoideum sylvanum*); idem, May 28 (N-ND, syntype of *T. thyrsoideum sylvanum*); idem, May 24 (F, NY, syntypes of *T. thyrsoideum sylvanum*); *Lunell*, Ward Co., Minot, along Mouse River, in timber, July 1, 1909 (G-ND 14394, type of *T. Lunellii;* G, photo of type; N-ND, isotype); *Lunell 76*, Benson Co., Lees, in dry soil on the prairies, June 10, 1909 (G-ND, type of *T. thyrsoideum;* G, photo of type; N-ND, NY, isotypes). South Dakota: *E. J. Palmer 27,198*, Lawrence Co., Boulder Canyon near Deadwood, wet rocky ground along brook, June 12, 1929 (G); *Hayward 1404, 1425, 1840, 2060, 2200, 2304* & *2410*, Black Hills, various localities, 1927 (F). Saskatchewan: *Bourgeau*, 1857–58 (G, paratype of *T. venulosum*); *J. Macoun 2952*, Crane Lake, June 9, 1894 (G); *Macoun & Herriot 69,802*, Tramping Lake, Aug. 4, 1906 (G); *J. Macoun 12,316*, near Prince Albert, lat. 53°, July, 1896 (G). Alberta: *J. Macoun 59,524*, Burnt River, north of Peace River, open prairies, July 19, 1903 (G); *Moodie 936*, Red Deer Valley, vicinity of Rosedale, low ground, alt. 2200–2500 ft., June 1, 1915 (F, G); *Raup 2430, 2433, 2434, 2435a, 2439, 2440, 2442* & *2444*, Wood Buffalo Park, various localities, 1928–29–30 (G). Montana: *B. J. Jones*, Gallatin Co., Sedan, June 11, 1901 (G); *Flodman 485*, Gallatin Co., East Gallatin Swamps, alt. 5000 ft., July 24, 1896 (US). Wyoming: *Clifford Richardson*, Alkali Co., Branch of Sandy R., 1878 (G, paratype of *T. venulosum*); *A. Nelson 7307*, Albany Co., Chug Creek, on the open bottoms, June 29, 1900 (G); *C. Schubert*, Albany Co., Bear Creek about 2 miles from Eagle Peak, and 4 miles from Laramie Peak, Aug. 22, 1899 (US); *Forwood*, Wind River, July 24, 1882 (G).

British Columbia: *Raup & Abbe 3557*, north bank of Peace R., at Taylor Flats, dry bluffs, about 56° 8′ N., 120° 40′ W., alt. 1600 ft., June 12, 1932 (G); *McCabe 674*, Chezacut, very abundant, even in dry sites, Aug. 30, 1933 (UC); *S. Brown 960* & *972*, North Branch Saskatchewan, Kootenay Plains, June 17, 1908 (G). Fig. 92, a–e.

93. T. confine Fernald, Rhodora, **2:** 232, 1900. *T. purpurascens* L. sensu DC. Syst. **1:** 174, 1817. *T. purpurascens* L., β *monoicum* DC. Syst. **1:** 174, 1817. *T. dioicum* × *purpurascens* Trel., Proc. Bost. Soc. Nat. Hist. **23:** 301. 1886. *Planta* 25–120 cm. *Folium* basilarium vel solitarium vel deest, caulinaria 1–5 in planta. *Pedunculi* fructuum (0.5)–1.5–2.5–(3.0) cm. ascendentes. *Sepala* floris maris 2.5–5.0 mm. longa, foeminei 1.5–2.4 mm. *Filamenta* 3.0–4.5–(5.5) mm. *Antherae* (2.0)–3.0–

4.0 mm., *acumine* ca. 0.4 mm. *Stigma* (2.0)–2.5–4.0–(5.0) mm. *Carpella* matura stipite 0.1–0.2 mm., ventre 4–6 mm. longo et 2.5–2.7 mm. lato, *nervis* nonnunquam ramosis sinuosisque. Floret Junio vel Julio et interdum Augusto.—LABRADOR: *J. Fowler*, Lower East Main Coast, Aug. 20, 1892 (US). QUÉBEC: *D. Potter 382*, James Bay, East Main, marshy river bank, July 11, 1929 (G); *Williams & Fernald*, Témiscouata Co., Rivière-du-Loup, rocky bank of the St. Lawrence, Aug. 2, 1902 (G); *Rousseau 26,423*, comté de Rimouski, pointe du Vieux-Bic, sur les schistes, 30 juin, 1927 (G); *Fernald & Pease 25,074*, Matane Co., Ste. Félicité, brookside, July 17, 1922 (G); *Victorin & Rolland 18,777*, archipel de Mingan, île au Marteau, sur les rivages calcaires, 15 juillet, 1924 (G); *Victorin 4288*, Anticosti, cap à l'Ours, Aug. 23, 1917 (G); *Victorin 28,156*, Boucherville, bordant le rivage de l'une des îles, avec *Carex intermedia* et *Carex nutans*, 1 sept., 1928 (G); *Victorin 3233*, St.-Eustache, Aug., 1916 (G); *Ouimet & Fassett 18,100*, Gatineau Co., Hull, June 29, 1934 (C); *C. H. Knowlton*, Philipsburg, dry open woods, shale ledges, July 18, 1931 (G). NEW BRUNSWICK: *Chalmers 844*, Restigouche, Eel River, woods, July 29, 1876 (C, marked by Trelease *T. dioicum* × *purpurascens;* G, same note); *J. Macoun 21,136*, along the St. John, above Woodstock, July 3, 1899 (C, G); *Williams, Collins & Fernald*, Gorge of Aroostook River, Andover, talus from calcareous cliffs, July 17, 1902 (G); *Pease & Edgerton 27,259*, Upper Mangerville, alluvium by St. John R., June 29, 1939 (G); *G. U. Hay*, St. John, Aug., 1890 (G). MAINE: *Fernald*, Aroostook Co., Fort Fairfield, fruits from plant in river-thicket, Sept. 19, 1900 (G, TYPE of *T. confine;* C 69,609, ISOTYPE); *Fernald 215*, Fort Fairfield, abundant in alluvial thickets, fl. June 6, 1901, fr. July 16, 1902 (G, NE). VERMONT: *Eggleston 4869*, Ferrisburg, Gardener's Island, July 17, 1909 (G); *Flynn*, Chittenden Co., Burlington Bay, rocky shore of Lake Champlain, Sept. 8, 1909 (G, NE); *C. H. Knowlton*, Franklin Co., Lake Champlain, Swanton, sandy shore, July 24, 1926 (NE); *C. H. Knowlton*, Grand Isle Co., Grand Isle, swampy woods near Lake, July 24, 1935 (NE). NEW YORK: *House 10,323*, Essex Co., Port Henry, rocky shore of Lake Champlain, July 12, 1924 (G, US). ONTARIO: *J. Macoun 2956*, Ottawa, Rideau Hall, thickets, Aug. 8, 1894 (C, paratype); *D. Potter 381*, James Bay, Moose River, north end of Saw Pit Island, marsh, July 1, 1929 (G); *Pease & Bean 23,557*, Thunder Bay District, W. side of Jack Fish Bay, beside a brook, July 8, 1933 (C, G); *Taylor, Losee & Bannan 905*, Thunder Bay District, Sibley Tp., Talus Bay, gravelly beach, June 24, 1936 (C). MICHIGAN: *Fernald & Pease 3306*, Schoolcraft Co., east of Manistique, glades and openings in thicket bordering calcareous beach of Lake Michigan, July 9, 1934 (G). MANITOBA: *Bourgeau*, Lake Winnipeg Valley,

1857 (G); *G. Gardner*, Moose Factory, South Shore, 19 juin, 1932 (ANS). MINNESOTA: *Lakela 1408 & 1428*, Duluth, June 11 & 19, 1936 (ANS); idem, June 17, 1938 (G). FIG. 93, a–f.

Thalictrum dioicum × *purpurascens* Trel. also included *T. coriaceum* (Britt.) Small. Trelease referred to those plants being "hybrids of *T. dioicum* L. with *T. purpurascens* L. or *polygamum* Muhl." No specimen has been found marked by Trelease *T. dioicum* × *polygamum*. Oddly enough, one of these supposedly hybrid plants comes from a region where the only other *Thalictrum* yet known to occur is *T. polygamum*.

94. T. CONFINE Fern. var. **Greeneanum,** var. nov. *Planta* 30–70 cm. *Folia* basilaria 1–3, caulinaria 1–2 in planta. *Filamenta* 2.5–3.2 mm. *Antherae* 2.5–3.0 mm., *acumine* 0.3–0.7 mm. *Stigma* 2.0–3.0 mm. *Carpella* matura ventre 4.5–5.0 mm. longo et 2.0–2.3 mm. lato. Floret saepius Julio, interdum Junio.—COLORADO: *Parry*, Middle Park, July, 1864 (G, paratype of *T. venulosum*); *Vasey 10B*, Middle Park, 1868 (G, paratype of *T. venulosum*); *Baker 551*, Gunnison, alt. 7680 ft., July 23, 1901 (G, TYPE; NY, US, ISOTYPES); idem *556* (G, US); *Hall & Harbour 8*, lat. 39°–41°, 1862 (F); *Coulter*, Weston's Pass, alt. 11,000 ft., July 18, 1873 (US); *Patterson*, Middle Park, west end, damp plains, July 27, 1875 (F); *B. H. Smith*, Archuleta Co., Pagosa Springs, June 15, 1894 (ANS); *B. H. Smith*, Mineral Co., Wagon Wheel Gap, July, 1882 (ANS). UTAH: *Pennell & Shaeffer 22,522*, Wasatch Co., head of Daniels Canyon, northeast of Hebert, below Daniels', rocky slope, alt. 7900–8000 ft., July 1–2, 1938 (ANS); *Watson 9*, Wahsatch, Provo Canon, July 1869 (US).

E. L. Greene left two unpublished names on sheets of this variety.

95. T. CONFINE Fern., var. **columbianum** (Rydb.), stat. nov. *T. fissum* Greene, Pittonia, **4:** 233, 1901. *T. columbianum* Rydberg, Bull. Torr. Bot. Club **39:** 320, 1912. *T. occidentale* Gray, var. *columbianum* (Rydb.) St. John, Fl. South. Wash. & Adj. Id. 156, 1937. *Planta* 50–80 cm. *Folia* basilaria 0–1, caulinaria 1–3 in planta. *Pedicelli* 0.5–2.5 cm. aetate fructuum maturandorum. *Filamenta* 3–6 mm. *Antherae* 1.5–4.0 mm. *Stigma* 2.0–3.0 mm. *Carpella* matura ventre paullulum compresso, 3–6 mm. longa et 1.8–2.5 mm. lata. Floret Majo, Junio Julioque.—IDAHO: *Mulford*, De Lamar, alt. 7000 ft., July 7, 1892 (G, paratype of *T. columbianum*). OREGON: *Cusick 1137*, 1886 (NY, paratype of *T. columbianum*); *Cusick 1337*, Mts. E. Oregon, a form not common in the mountains, June, July, 1886 (G, NY, paratypes of *T. columbianum*); *Henderson 9056*, Harney Co., Steins Mts., near Sheep Camp, moist bottoms in aspen woods,

alt. 5500 ft., June 15, 1927 (CA); *Henderson 9058*, Harney Co., 15 miles above Burns, up Silvies River, moist sunny flats, June 13, 1927 (CA); *Cusick*, Stein's Mountains, at the head of Wild Horse Creek, July 14, 1898 (G-ND, type of *T. fissum;* G, photographs of the type). WASHINGTON: *Elmer 599*, Okanogan Co., Loomiston, Mount Chapaca, abundant in the meadow on the south slope, Aug., 1897 (NY, TYPE of *T. columbianum;* BG, US, ISOTYPES); *G. R. Vasey 155*, 1899 (G, NY, US, paratypes of *T. columbianum*); *Henderson 2367*, Yakima Co., June, 1892 (G); *Piper 1467*, Withman Co., Pullman, June 26, 1893 (G); *Lyall*, Pend d'Oreille River, 1861 (G).

BRITISH COLUMBIA: *Raup & Abbe 2642*, vicinity of Hudson Hope, south slopes of Peace River Valley, about 56° 1′ N., 121° 53′ W., June 21, 1932 (G); *McCabe 2407*, fourteen miles north of Kamloops, moist hollow in open range, June 13, 1935 (UC); *McCabe 8232*, one mile southeast of New Hazelton, semi-open forest edge, border of bog, Aug. 9, 1940 (UC).

Subsectio **Clavocarpa** subsect nov. *Plantae* glabrae elatae rigidae. Species duae, alia stolonifera alia haud. *Caulis* saepius glauca. *Folia*, nisi inferiora, sessilia in apice dilatationis petiolaris. *Inflorescentia* paniculata copiosa. *Sepala* lanceolata. *Stigma* bialatum. *Carpella* matura recta stipitata, *nervis* exsertis sublatis in costis obtusis, nervo ventrali convexiore quam dorsali. Species typica *Thalictrum coriaceum* (Britt.) Small sit.

Planta stolonifera; antherae luteae vel viridulae; carpella matura ventre lanceolato . . . . . 96. *T. Steeleanum.*
Planta haud stolonifera; stamina imprimis lutea, deinde purpurascentia; carpella matura ventre ovoideo . . . . . 97. *T. coriaceum.*

96. T. **Steeleanum,** sp. nov. *Planta* glabra stolonifera 1.0–1.5 m. *Foliolae* majusculae, 2.5–7.0 cm. latae, interdum subquadratae. *Sepala* mascula 4–5 mm. longa, foeminea ovata ca. 2 mm. longa. *Filamenta* saepius lutea, interdum purpurascentia 4.0–4.5 mm. *Antherae* saepius luteae, interdum viridulae, lineares, 3.2–4.5 mm., *acumine* 0.4–1.0 mm. *Stigma* 2.0–2.8 mm. *Carpella* matura saepius purpurascentia, *stipite* 0.6–1.8 mm. longo, ventre lanceolato 4.0–6.5 mm. longo et 1.7–2.2 mm. lato, *nervis* saepius undulatis. Floret Majo et interdum Junio.—PENNSYLVANIA: *Brown & Saunders*, Somerset Co., near Rockwood, along Casselman River, on opposite sides of the river, June 3, 1899 (ANS). MARYLAND: *Steele*, C. & O. Canal, April 11, 1903 (US); *Steele*, bank of Potomac above D.C., July 23, 1902 (G, NY); *Steele*, Potomac, near the Md. line, Feeder Dam Island, July 10, 1902 (NY); *Steele*, idem, May 10 (G, NY); *Steele*, bank of Potomac, above D.C., July 26, 1902 (G, NY); *E. L. Morris 1527*, Montgomery Co., Plummers Island, alluvial woods, May 18, 1902 (BG); *Long & Bartram 1292*, Cecil Co.,

north of Conowingo, woods, June 1, 1913 (G, TYPE); idem *1287* & *1289* (ANS); *Hitchcock 12,902a*, Great Falls, woods along canal, June 21, 1917 (G); *Shriver*, Cumberland, 1894 (NY). VIRGINIA: *Allard 2873*, Fauquier Co., near Markham, woods at top of Rattlesnake Mountain, abundant and in full bloom, underground rhizomes a rich golden yellow, May 30, 1937 (G); *E. L. Morris 2361*, Falls Church, dark woods, May 1896 (BG); *Camp 1174a & 1174b*, Shenandoah National Park, south and southeast of Skyland, alt. about 3500 ft., May 25, 1936 (NY); *Rawlinston 16*, Madison Co., near Hoover's Camp, June 22, 1934 (US); *Wherry & Pennell 13,344*, Page Co., southeast of Luray, Stony Man Mountain, Aug. 24, 1927 (M). FIG. 96, a–d.

97. T. CORIACEUM (Britt.) Small, Mem. Torr. Bot. Club, **4:** 98, 1893. *T. dioicum* L., β? *stipitatum* Torr. & Gray, Fl. N. Amer. **1:** 38, 1838. *T. dioicum* L., var. *stipitatum* Lecoyer, Bull. Soc. Bot. Belg. **24:** 142, 1885, pars. *T. dioicum* L., var. *coriaceum* Britton, Bull. Torr. Bot. Club, **25:** 136, 1898. *T. caulophylloides* Small, Bull. Torr. Bot. Club, **25:** 136, 1898. *Planta* glabra, haud stolonifera, 65–100–(150) cm. *Foliolae* (1)–3–(7) cm. latae. *Sepala* floris masculi 3.5–4.0 mm. longa, foeminei fere lanceolata 1.5–2.0 mm. longa. *Filamenta* 4.5–5.0 mm. *Antherae* 2.0–3.5 mm., *acumine* ca. 0.4 mm. *Stigma* 1.5–2.5 mm. *Carpella* matura *stipite* 0.3–5.5 mm., ventre ovoideo 2.3–4.0 mm. longo et 1.3–2.0 mm. lato, *nervis* paululum sinuosis. Floret Junio, rarissime Majo vel Julio.—WEST VIRGINIA: *Britton*, White Sulphur Springs, May 16, 1897 (NY). VIRGINIA: *Small*, Smyth Co., slope of White Rock Mountain, alt. 3500–4000 ft., June 21, 1892 (F, M); *A. H. Curtiss*, Bedford Co., 1871 (F, G, M); *E. S. & Mrs. Steele 146*, near Luray, Stony Man Mountain and vicinity, alt. 3600 ft., Aug. 18, 1901 (G, M, NY, US); *Steele*, Augusta Co., vicinity of Augusta Springs, over meter high, alt. + 1200, Sept. 8, 1908 (M, US). NORTH CAROLINA: *M. A. Curtis*, Bald Mt. (G, type of *T. dioicum* β? *stipitatum* Torr. & Gray); *Small & Heller 263*, Watauga Co., Blowing Rock Mountain, alt. 4000 ft., July 29, 1891 (NY, TYPE of *T. dioicum*, var. *coriaceum;* US, ISOTYPE); *Porter*, Mtns., June 28, 1880 (ANS, NY, paratypes of var. *coriaceum*); *Small & Heller*, Blowing Rock Mountain, alt. 4000 ft., June 10–20, 1891 (F, NY, paratypes of var. *coriaceum*); *Small & Heller*, eastern slopes of Blowing Rock Mountain, July 7, 1891 (F, paratype of var. *coriaceum*); idem *491* (ANS, F, M, paratypes of var. *coriaceum*); *Small & Heller*, on the road between Blowing Rock and Shull's Mill, June 16–17, 1891 (F, M, NY, paratypes of var. *coriaceum*); *Small & Heller 491*. Caldwell Co., summit of Stone Mountain, July 9, 1891 (ANS, US, paratypes of var. *coriaceum*); *House 4346*, Transylvania Co., Pisgah Ridge, alt. 4000–5000 ft., July 4, 1909 (US); *Biltmore Herbarium 6043a*, Buncombe Co., slopes of Cedar Cliff

Mountain, rich soil, May 24, 1898 (NY); *Mohr*, Grandfather Mountain, rich woods, July 27, 1894 (US). GEORGIA AND CAROLINAS: *Buckley*, in mountibus Carolinae et Georgiae (M, paratype of *T. dioicum* × *purpurascens*); *Wright*, N. Georgia, 1875 (G). KENTUCKY: *Kearney 290*, Harlan Co., Big Black Mountain, Aug., 1893 (G, NY). TENNESSEE: *Svenson 8309*, Sevier Co., Thomas Ridge, south of Indian Gap, Aug. 12, 1935 (BG); *Ruth 1800*, Blount Co., Cade Cove Mountain, mountainsides, July, 1892 (NY, type of *T. caulophylloides*); *Eggert*, Davidson Co., woods, July 13, 1897 (M, NY). FIG. 97.

(*To be continued*)

AMERICAN THALICTRA AND THEIR OLD WORLD ALLIES

Bernard Boivin

(*Continued from page 445*)

Subsection **Compressa** subsect. nov. *Plantae* erectae rigidae. *Folia* supraternatisecta. *Radix* plus minusve stolonifera. *Filamenta* purpurascentia. *Antherae* luteae. *Stigma* bialatum. *Carpella* matura saepius valde reflexa plus minusve compressa, inflata tamen, nervosa vel costata, costis si adsunt obtusis et nervis obscuris. Crassitudo carpelli dimidias latitudinis vel aequat vel superat. *Nervus* ventralis carpelli convexior quam dorsalis, vel ventralis basis convexior quam dorsalis basi et dorsalis apex convexior quam ventralis apex. Species typica *Thalictrum occidentale* Gray sit.

a. Crassitudo carpelli maturi dimidias latitudinis aequat. Venter ejusdem ovatus costatus, sesquies longior quam latus ..... 98. *T. nigromontanum.*

a. Crassitudo carpelli latitudinem subaequat. Carpella matura nervosa, ter vel quater longiora quam lata .... *b.*

b. Carpella matura divaricata stipitata, ventro lanceolato. Inflorescentia ampla ad 50 cm. longa et foliosa .... *c.*

c. Stigma 3.5–4.5 mm. ..... 99. *T. occidentale,* var. *typicum.*

c. Stigma 5–6 mm. ..... 100. *T. occidentale,* var. *Macounii.*

b. Carpella matura conspicue reflexa, ventre ter longiore quam lato. Inflorescentia exserta fere decimetralis 101. *T. occidentale,* var. *palouense.*

98. T. **nigromontanum,** sp. nov. *Planta* 45–65 cm. *Petioli* foliorum superiorum breves. *Inflorescentia* 5–15 cm. longa. *Pedunculi* 1–2 cm. *Sepala* floris maris 3.5–4.0 mm. longa, elliptica, foeminei ca. 1.5 mm. *Filamenta* 5.0–6.5 mm. *Antherae* ca. 3 mm., *acumine* ca. 0.4 mm. *Stigma* 3–4 mm. *Carpella* matura compressa et costata, valde reflexa, *stipite* 0.2–0.3 mm.,

ventre ovato 4–5 mm. longo, 2.5–3.0 mm. lato et ca. 1.5 mm. crasso, *nervis* a costis parum distinctis. Nervus ventralis convexior quam dorsalis. Tempus florendi a lectoribus ignotum, verosimiliter tamen Junium.—South Dakota: *W. P. Carr 135*, Deadwood, shady woods, July 31, 1913 (C, type; F, G, NY, isotypes); *Hayward 847* (in part), Black Hills, Rapid Creek & Dark Canyon, 1927 (F); *Hayward 1331*, Black Hills, Spearfish Canyon, lower 7 miles above fish hatchery, 1927 (F); *Hayward 1337*, Black Hills, Deadwood, near Pinecrest Camp, 1927 (F).

99. T. occidentale Gray. *T. dioicum* L., var. *stipitatum* Lec., Bull. Soc. Bot. Belg. **24:** 142, 1885, pars, nec *T. dioicum*, β? *stipitatum* Torr. & Gray, Fl. N. Amer. **1:** 38, 1838. *T. dioicum* L., var. *oxycarpum* Torr., Bot. Wilkes Exped. **17:** 212, 1874. *Planta* glabra vel puberulens. *Pedunculi* divaricati (1)–2–(5) cm. *Sepala* floris masculi 3.5–5.0 mm. longa et foeminei 1.5–2.5 mm. longa. *Filamenta* (5)–6–7–(10) mm., purpurascentia. *Antherae* 2–4 mm. Carpella matura nervosa, vel *nervo* dorsali convexo et ventrali convexiore, vel dorsali basi concavo et apice convexo.

The form of the fruit is highly variable in this species and transitional forms to other species occasionally occur. This also seems to hold true for the Incurvata and Laminaria. These intermediates seem to point toward the following series: *T. venulosum—T. confine—T. occidentale—T. Fendleri—T. polycarpum* in which each species is most closely related to the two adjoining ones. The two varieties given in synonymy cannot at present be related to any of the following three.

99. T. occidentale Gray, var. **typicum.** *T. occidentale* Gray, Proc. Amer. Acad. **8:** 372, 1873. *Planta* 60–120 cm. *Inflorescentia* 20–50 cm. longa, foliosa, *foliis* nonnullis petiolatis et triternatis. *Ovaria* ventro lanceolato, interdum ovato. Stigma 3.0–4.5 mm. *Carpella* matura divaricata, *stipite* 0.4–1.2 mm., ventre lanceolato 6–10 mm. longo, 1.6–2.5 mm. lato. Floret Majo et Junio.—Washington and Oregon: *Hall*, 1871 (G, type; F, isotype); *J. Howell*, Cascades, June, 1879 (G); *J. & T. Howell*, near Cascades, in rich woods, May–June, 1880 (ANS, F, US); *T. Howell*, Cascades, May, 1882 (NY); *Suksdorf 2339*, Skamania Co., near lower Cascades, May 30, 1886 (G); *Epling 5533*, Benton Co., Corvallis, May, 1922 (F); *F. E. Lloyd*, Forest Grove, low grounds, June 1, 1894 (NY); *Henderson 8*, Sandy River, warm rich hillsides, May 21–June 12, 1883 (NY); *Henderson 877*, near Columbia River, along creeks, moist rather open woods, May 27, 1924 (G). Fig. 99.

100. T. occidentale Gray, var. **Macounii** var. nov. *Planta* 80–125 cm. *Inflorescentia* sicut praecedentis. *Pedunculi* (2)–

3–(5) cm. *Ovaria* ventro lanceolato. *Stigma* 5–6 mm. *Carpella* matura *stipite* ca. 0.5, caeteris ut praecedentis. Floret Junio.—BRITISH COLUMBIA: *J. Macoun 77,395*, Vancouver Island, Koksilah River, near Cowichau, July 30, 1908 (NY, TYPE; C, ISOTYPE); *Newcombe 8*, Pr. of Wales Isl., Karta Lake, 1901–02 (F); *Newcombe 416*, Victoria, June 4, 1896 (F); *Lyall*, Vancouver Island (NY); *J. Macoun*, Vancouver Island, Nanaimo, June 10, 1887 (US); *Carter 157*, Vancouver Island, Alberni, Roger Creek, creek-bottom, May, 1915 (G); *Rosendahl 1988*, Vancouver Island, Cameron River Valley, alt. 600 ft., June 28, 1907 (US); *J. Macoun 22*, Vancouver Island, borders of streams, July 10, 1887 (G); *C. B. Wood*, Vancouver's Island, 1859 (G); *J. Macoun 849*, Sproat, woods, June 24, 1890 (C).

101. T. OCCIDENTALE Gray, VAR. PALOUENSE St. John, Fl. South. Wash. & Adj. Id. 158, 1937. *T. heterophyllum* Nutt. ex Gray, Proc. Amer. Acad. 8: 372, 1873, ut synonymon dubium, nec *T. heterophyllum* Lej., Rev. Fl. Spa, 109, 1824, nec *T. heterophyllum* Schur ex Verh., Naturf. Ver. Bruenn, **15,** 2: 20, 1877, nec *T. heterophyllum* Turcz. ex Ledeb., Fl. Ross. **1:** 727, 1843. *T. propinquum* Greene, Fedde, Rep. Nov. Spec. **7:** 254, 1909. *T. rainierense* St. John, Madroño, **4:** 114, fig. 1, 1937. *Planta* (15)–60–(90) cm. *Inflorescentia* exserta 5–20 cm. longa, *foliis* reductis sessilibusque. *Pedunculi* divaricati (1)–2–(4) cm. fere omnes ejusdem longitudinis in eadem planta. *Ovaria* ventro persaepius ovato. *Carpella* matura conspicue reflexa, *stipite* 1.2–1.5 mm., ventro 4–7 mm. longo et 1.8–3.0 mm. lato. Floret Junio, Julio interdum quoque Majo et Augusto.—ALBERTA: *J. Macoun 64,406, 64,407, & 64,409*, Lake Louise, July, 1904 (C); *Butters & Holway 83*, Banff, alt. 5400–5800 ft., July 7, 1907 (G, NY); *S. Brown 434*, Pipestone Valley, alt. 6000 ft., July 7, 1906 (G); *Cram*, Crowsnest Forest Reserve, July 3, 1920 (C). MONTANA: *Flodman 484*, Bridger Mts., near The Pass, July 28, 1896 (US); *G. N. Jones 5495, 5315 & 5330*, Glacier National Park, Curbank Creek and Many Glaciers, July, 1934 (G); *J. N. Rose 38*, near Red Lodge, July 25, 1893 (G); *Kirkwood 1876*, Clearwater Forest, on Fish Lake Creek, Aug. 20, 1924 (G); *Watson 7*, Bard Mountain, alt. 7000 ft., July 21, 1880 (G). IDAHO: *Macbride 593*, Elmore Co., Trinity, creek-banks, alt. 4500 ft., Aug. 12, 1910 (C); *Sandberg, MacDougal & Heller 199*, Nez Perces Co., Craig Mountains, vicinity of Lake Waha, alt. 900 m., May 20, 1892 (G); *E. B. & L. B. Payson 2009*, Fremont Co., Henry Lake, aspen groves, alt. 6000 ft., July 14, 1920 (CA, G); *Piper 1468*, Latah Co., Cedar Mountains, July 7 (G); *Macbride 420*, Owyhee Co., Silver City, slopes along streams, alt. 7000 ft., July 18, 1910 (G). WYOMING: *L. O. & R. P. Williams 3028*, Big Horn Co., 10–15 miles east of Kane, west slopes of the mountains, alt. 8000 ft., June 19, 1936 (G); *Goodding 1971*, Carbon Co., Bridger

Peak, moist timbered flats, Aug. 24, 1903 (G); *L. O. & R. P. Williams 3639*, Park Co., Beartooth Lake, in pine woods, alt. 9000 ft., July 21, 1937 (G); idem *3552*, Crazy Woman Creek, July 14 (G); *E. B. & L. B. Payson 2999*, Sublette Co., Gros Ventre Mountains, 15 miles northeast of Bondurant, open slopes, Aug. 13, 1922 (F, G, US); *Williams & Pierson 652*, Teton Co., vicinity of Hoback Canyon, spring-bank, alt. 7000 ft., June 19, 1932 (CA, G). NEVADA: *Nelson & Macbride 1936*, Elko Co., Jarbridge, aspen copses, alt. 7000 ft., July 6, 1912 (G, NY); *Nelson & Macbride 2210*, Elko Co., Mountain City, aspen copses, alt. 7000 ft., Aug. 14, 1912 (G, NY, US); *Maguire & Piranian 15,523*, along Ole Creek, woodlands, June 28, 1934 (G). OREGON: *L. S. Rose 36,476*, Wallowa Co., 1 mi. s. Wallowa Lake, alt. 4600 ft., July 18, 1936 (CA); *Thompson 13,340*, Baker Co., near Cornucopia, rocky slopes of Wallowa Mts., July 18, 1936 (ANS, NY); *Henderson 5454 & 5658*, E. Grant Co., Austin Ranch, 1925 (CA, G); *Nuttall*, Columbia Woods (ANS, G, NY) with *Thalictrum heterophyllum* in Nuttall's handwriting). WASHINGTON: *Piper 2022*, Mt. Rainier, rich meadows, alt. 6500 ft., Aug. 1–15, 1895 (G, isotype of *T. rainierense*); *Piper*, Walla Walla Co., Blue Mts., along streams in woods, July 17, 1896 (G, ISOTYPE of *T. occidentale* var. *palouense*); *Thompson 6945*, Okanogan Co., moist shaded slopes by road to Salmon Meadows, alt. 3500 ft., June 25, 1931 (G); *Thompson 7793*, Chelan Co., Wenatchee Mts., below Stuart Pass, moist alder groves, alt. 4500 ft., July 27–31, 1931 (ANS, G). BRITISH COLUMBIA: *J. M. Macoun 33,606*, Tami Hy Mt., Chilliwack Valley, alt. 5000 ft., July 30, 1901 (G-ND, type of *T. propinquum*); *Heacock 53*, Emerald Lake, Avalanche Path, alt. 4400 ft., June 29, 1904 (G, NY, US, paratypes of *T. propinquum*); *Shaw 970*, in the Big Bend district, about 118° 20′ W., 51° 45′ N., alpine meadow, alt. 6000, July 24, 1905 (G, NY); *McCabe 4924*, Elk River Road, 17 miles north of Natal, edges of openings of green spruce timber, Sept. 8, 1937 (UC); *Raup & Abbe 3867*, along Wicked R., near the Peace, about 56° 4′ N., 123° 39′ W., open woods, July 18, 1932 (G). FIG. 101, a–e.

The type of *T. propinquum* Greene is not in the Herbarium of the Canadian Geological Survey as stated in the original description; similarly with the types of *T. tortuosum* Greene, *T. Mortoni* Greene and *T. glaucodeum* Greene. In his last letter to J. M. Macoun, Greene wrote:

April 28, 1915.

. . . . . .

Another parcel of your Thalictrum went last night; only a small parcel, of sheets on which I have some notes to make, remains.

. . . . . .

That "small parcel" apparently was never sent, for 66 of the numbers of the Herbarium of the Geological Survey which are represented in the herbarium at Notre-Dame University, are all missing in the National Herbarium of Canada.

Subsectio **Laminaria,** subsect. nov. *Plantae* persaepius plus minusve stoloniferae. *Carpella* matura valde compressa vel laminaria, *nervis* rugosis, haud costata, vel, si costata, costis acutis. Crassitudo carpelli a dimidiis latitudinis ejus recedit. Species typica *Thalictrum Fendleri* Gray sit.

a. Carpella haud reflexa, ovata ad lanceolata, viridia vel brunnea, plus minusve pubescentia vel interdum glabra, nervis lateralibus raro ramosis et sinuosis, nunquam minute sinuosis, nec anastomosantibus, reticulatis. Planta nunquam pruinosa nec caesia nec glauca. Cauli tamen interdum purpurascens....*b.*

b. Nervi laterales 3 conspicui. Planta pubescens.....102. *T. Fendleri.*

b. Nervus lateralis solitarius vel, si ternatus, medius conspicuor et multo crassior quam duo alii. Plantae saepius glabrae....*c.*

c. Carpella ventre ca. 2.5 mm. longo....*d.*

d. Nervi haud sinuosi.....103. *T. Fendleri,* var. *Wrightii.*

d. Nervus ventralis, licet alii, valde sinuosi. 104. *T. Fendleri,* var. *sinuosum.*

c. Carpella ventre ca. 5 mm. longo. 105. *T. Fendleri,* var. *quadrinervatum.*

a. Carpella plura vel omnia reflexa, obovata vel semiobovata, plus minusve pruinosa glauca, nervis lateralibus saepius ramosis anastomosantibus reticulatis minute sinuosis. Planta glabra pruinosa et plus minusve glauca vel caesia. Ovaria ventre compresso orbiculari et nunquam rugoso. 106. *T. polycarpum.*

Practically, *T. polycarpum* Wats. is always glabrous while *T. Fendleri* Engelm. is always more or less pubescent, at least within the range of the former. Ovaries, fruits and under surface of upper leaves always show this character clearly. The fruits of these two species are endlessly variable. Some of these variations are more frequent in one part of the range, but they are liable to be found anywhere throughout the range and none of them is clearly cut from the other variations. However, three variations of *T. Fendleri* have a geographic range of their own and outnumber the intermediate forms.

102. T. FENDLERI Engelm. ex Gray, Pl. Fendl. 5, 1849. *T. Fendleri,* var. *platycarpum* Trel., Proc. Bost. Soc. Nat. Hist. **23:** 304, 1886. *T. platycarpum* (Trel.) Greene, Pittonia, **1:** 166, 1888, nec. *T. platycarpum* Hook. f. & Th., Fl. Ind. **1:** 13, 1855. *T. hesperium* Greene, Pittonia, **2:** 24, 1889. *T. polycarpum*

Wats., var. *hesperium* (Greene) Jepson, Fl. W. Midd. Cal. 202, 1901. *T. omissum* Greene, Fedde, Rep. Sp. Nov. **7**: 254, 1909. *T. stipitatum* Rydberg, Fl. Rocky Mts., 290, 1918, nec *T. stipitatum* Rose, Contrib. U. S. Nat. Herb. **8**: 28, 1903. *T. Fendleri*, var. *hesperium* (Greene) Jepson, Fl. Calif. **1**: 530, 1921. *Planta* pubescens, raro subglabra vel glabra etiam, nunquam pruinosa nec caesia nec glauca, *caulis* tamen interdum purpurascens, 60–150 cm. *Radix* plus minusve stolonifera. *Sepala* erosa, floris maris ovata vel elliptica 3–5 mm. longa, foeminei ovata vel rhomboidea vel late lanceolata (1.0)–1.5–(2.0) mm. longa. *Filamenta* 4.0–7.5 mm. lutea. *Antherae* oblongae vel lineares, luteae, 2.2–3.4 mm., *acumine* 0.1–0.8 mm. *Stigma* 1.5–4.0 mm. *Ovaria* dense viridia, ventro ovato ad lanceolato, saepius densissime pubescente. *Carpella* matura haud reflexa, ovata ad lanceolata, viridia vel brunnea, plus minusve pubescentia vel interdum glabra, *stipite* (0.1)–0.5–(2.0) mm., ventre 2.7–9.0 mm. longo, 1.8–4.5 mm. lato, *nervis* lateralibus raro ramosis et sinuosis, nunquam minute sinuosis, nec anastomosantibus, nec reticulatis, nervo ventrali convexiore quam dorsali. Floret ab Aprili ad Septembrem.—Texas: *Ferris & Duncan 2569*, Jeff Davis Co., Davis Mts., Livermore Peak, July 9–12, 1921 (CA, M); *Havard 138*, Jeff Davis Co., Limpia Mts., July, 1883 (G); *Moore & Steyermark 3566*, Culbertson Co., Guadalupe Mountains, McKittrick Canyon, shaded rocky woodland, alt. 2000 m., July 22, 1931 (G, M). Wyoming: *Tweedy 4244*, Carbon Co., forks Battle Creek, alt. 7200 ft., Aug. 15, 1901 (US, type of *T. omissum;* NY, isotype); *A. Nelson 7660*, Albany Co., Tie City, in a cañon, July 20, 1900 (G); *Payson & Armstrong 3603*, Lincoln Co., Alpine, on the Snake River near the Idaho boundary, Wolf Creek, aspen groves, July 25, 1923 (G). Colorado: *Hall & Harbour 8*, lat. 39°–41°, 1862 (BC, G, M); *E. L. Greene 593*, Golden City &c., 1871 (G, paratype of *T. Fendleri*, var. *platycarpum*); *F. E. & S. S. Clements 243*, El Paso Co., Minnehaha, alt. 2600 m., 1 julii, 1901 (NY, type of *T. stipitatum;* G, isotypes); *Baker, Earle & Tracy 343*, Montezuma Co., W. La Plata Mts., Chicken Creek, common, alt. 9000 ft., July 6, 1898 (G); *Rollins 1808*, Las Animas Co., 26 miles northwest of Trinidad, 2 miles north of the Pergatore River, dry hillside, stems single, alt. 7500 ft., July 3, 1937 (G); *Churchill*, Clear Creek Co., Brookvale, Bear Creek Canyon, June 17, 1918 (G); *Hermann 5399*, Garfield Co., Trapper's Lake, n. shore, open spruce-fir grove, alt. 9500 ft., July 29, 1933 (G). Utah: *M. E. Jones 1194*, Salt Lake Co., Wahsatch Mts., Alta, alt. 10,000 ft., Aug. 5, 1879 (CA); *Goodman & Hitchcock 1391*, San Juan Co., Abajo Mts., n. slope, beside small stream, alt. 8500–11,000 ft., July 1–2, 1930 (CA); *E. B. & L. B. Payson 4883*, Summit Co., foothills of Uinta Mts., near Mill Creek, dry clay slope, alt. 8200 ft., July 4, 1926 (G, US);

McKelvey 4204, Washington Co., Zion Natl. Park, Zion Cañon, alt. 4000–5000 ft., May 7, 1934 (G). NEVADA: *Clokey 5462*, Clark Co., Lee Cañon, gravelly flat, with *Pinus scopulorum* and *Populus aurea*, alt. 2670 m., Aug. 1, 1935 (CA, G, UC); *M. E. Jones*, Humboldt Co., East Humboldt Mts., alt. 10,000 ft., Aug. 13, 1897 (UC); *P. B. Kennedy 1923*, Washoe Co., Hunter Creek, elev. 6000 ft., Aug. 2, 1912 (CA, G); *Baker 1323*, Ormsby Co., head of Fall Creek, alt. 2460 m., July 15, 1902 (G, NY). NEW MEXICO: *Standley 4257*, Pecos River National Forest, Windsor Creek, alt. ca. 8600 ft., July 8, 1908 (G, M); *Wright 1851* [Wright's mss.: *151*, Grant Co., hillsides of Coppermine Creek, 2–4 ft. tall, Aug. 4] (G, NY, US); *Metcalfe 248*, Socorro Co., Mogollon Mts., on Mogollon Creek, alt. ca. 8000 ft., July 17, 1903 (G, M, UC, C-UC); *Wooton 228*, Lincoln Co., White Mts., alt. 6300 ft., July 28, 1897 (M, UC); *Fendler 13*, 1847 [Fendler's mss.: 13, Santa Fe, Creek-valley, shady places, margin of irrigation ditches at the foot of perpendic. rocks, 13th June–1st July in flower, 19th July in fruit. Flowers dioecious] (G, TYPE and ISOTYPES of *T. Fendleri;* ANS, M, NY, ISOTYPES); *J. M. Bigelow 963*, San Antonita, Camp B, mt. arroyos, Oct. 9, 1853 (G, NY, US, paratypes of *T. Fendleri* var.? *polycarpum*). ARIZONA: *Blumer 3309*, Rincon Mountains, Spud Ranch, rocky places, alt. 2260 m., Aug. 23, 1909 (G, M, UC); *M. E. Jones 24,850*, Huachuca Mountains, Ramsay Cañon, Sept. 28, 1929 (CA, G, M, UC); *Eastwood 5652*, Grand Canyon of the Colorado River, June 15, 1916 (G); *Wolf 2450*, Gila Co., 10 miles northwest of Pine, July 1, 1928 (CA, G); *Goodman & Payson 2841*, Apache Co., Luka-Chukai Mountains, damp steep slope of forest floor, alt. 2727 m., June 30, 1936 (G, M); *M. E. Jones 3969*, Flagstaff, Aug. 4, 1884 (CA, UC). CALIFORNIA: *Heller 11,669*, Butte Co., Jonesville, Aug. 8, 1914 (CA, G); *Mrs. R. M. Austin 146*, Butte Co., Colby, July, 1896 (M, UC, US, paratypes of *T. fissum*); *S. B. & W. F. Parish 1483*, San Bernardino Mts., [San] Ber[nardino] Valley, Aug., 1882 (G, type of *T. Fendleri* var. *platycarpum;* US, isotype); *Greene 452*, high Sierra, in cold wet shade near snow, Oct. 14, 1874 (G, paratype of *T. Fendleri* var. *platycarpum*); *Kellogg & Harford 3*, Oakland Hills, March 1, June 6, 1868–1869 (G, paratype of *T. Fendleri* var. *platycarpum*); *Heller 6679*, Monterey Co., on the Salinas Road, near Del Monte, May 5, 1903 (G, M, UC, US); *Munz & Johnston 8696*, San Bernardino Co., 1 mile south of Oak Glen, alt. 4500 ft., July 17, 1924 (G); *Lemmon*, San Bernardino Co., woods near Grayback, July, 1879 (G, paratype of *T. Fendleri* var. *platycarpum*); *A. Gray*, Santa Barbara, Feb.–May, 1885 (G, paratype of *T. Fendleri* var. *platycarpum*); *Coulter* (G, US, paratypes of *T. Fendleri* var.? *polycarpum*). OREGON: *Cusick 2036a*, Eastern Oregon, 1898 (G); *Eastwood & Howell 1614*, Lane Co., McKenzie Highway, near Blue River,

Apr. 17, 1934 (CA); *Constance*, Lane Co., Eugene, Young's Grove, Apr. 12, 1924 (G); *Henderson 9057*, Harney Co., Stein Mts., above Fish Lake, in aspen woods, alt. 6500 ft., July 20, 1927 (CA); *M. E. Peck, 14,202*, Stein Mts., above Alberson, along stream, alt. 7000 ft., July 4, 1925 (ANS). Mexico, baja California: *Orcutt*, n. Lower Cal., Topo Cañon Mts., July 30, 1883 (F). Fig. 102, a–e.

Trelease did not authenticate every *Thalictrum* he saw at the Gray Herbarium where he prepared his monograph of the genus; only four herbarium sheets bear his identification. These are the specimens he cited as *T. venulosum*. On about half a dozen other sheets are to be found pockets containing a smaller pocket on which he briefly copied out the label of the specimen, probably in order to be able to replace those pockets where they belong after the drawings were made, for these pockets contain dissected fruits, presumably the very ones from which the illustrations of his monograph were drawn.

It seems that, at the Gray Herbarium, Dr. B. L. Robinson went over Trelease's work, wrote the new species-covers needed and pasted all the revision labels as Trelease would have done, for all the names written by Robinson on sheets or covers in the genus *Thalictrum* are in perfect accordance with Trelease's treatment of that genus. Nearly all of the *Thalictra* bearing a revision label in Robinson's handwriting were collected prior to 1886. Very few indeed of the specimens collected after that date were revised by Robinson. The later specimens were obviously not accessible to Trelease for his monograph. Furthermore, a few specimens might have been collected prior to 1886, but mounted and revised by Robinson only later on. These can not be distinguished from those Trelease had on hand in 1886, and they introduce some uncertainty as to the correspondence of Robinson's labels with Trelease's opinions in the genus. However, in the absence of any better criterion, the revision of the former has been considered as representing the opinion of the latter, provided the specimens were collected prior to 1886 in a locality within the range given by Trelease in his monograph of that year.

There is no authenticated specimen of *T. Fendleri*, var. *platycarpum* Trel. except for one specimen from the Smithsonian Institution which bears the following note in Trelease's handwriting: *"T. Fendleri v. platycarpum or nearly that"*, but six

specimens at the Gray Herbarium bear a revision-label in Robinson's handwriting, stating that these are *T. Fendleri* Englm., var. *platycarpum* Trel. All six are from California and were collected in or before 1885. In view of this variety having been published in 1886 with California given as its range, it seems likely that these labels represent Trelease's opinion rather than Robinson's. The TYPE was selected from among these six specimens. It bears in a pocket a fruit dissected by Trelease and this apparently is the very fruit from which he made the drawing he published to illustrate *T. Fendleri* var. *platycarpum* in the paper where he published that variety. A drawing was made of this fruit (our fig. 102d) and one can not fail to note some similarity of pattern of this drawing to Trelease's drawing. Such sinuose lateral nerves are rather exceptional in *T. Fendleri*.

103. T. FENDLERI Engelm. var. WRIGHTII (Gray) Trel., Proc. Bost. Soc. Nat. Hist. **23:** 304, 1886. *T. Wrightii* Gray, Pl. Wright. **2:** 7 (269), 1853. *Planta* saepius glabra, omnibus partibus minor, haud stolonifera, (25)–50–(90) cm. *Stigma* ca. 1.5 mm. *Carpella* matura ovata ca. 2.5 mm. longa, *nervis* haud sinuosis, nervo dorsali convexo, ventrali convexiore quam dorsali. Nervus lateralis singulus, vel, si ternati, nervus medius conspicuor et multo crassior quam duobus aliis intermediis. Floret Augusto et interdum Julio vel Septembri.—ARIZONA: *M. E. Jones*, Santa Rita Mts., alt. 4500 ft., Aug. 24, 1903 (CA, UC); *Darrow & Arnold*, Santa Rita Mts., alt. 5500 ft., Aug. 23, 1936 (UC); *Harrison & Kearney 8907*, Santa Rita Mts., Aug. 20, 1932 (US). MEXICO, CHIHUAHUA: *Barlow*, Sierra Madre, ridge between Rio Chico and Rio Caballo, Sept. 30, 1911 (F); *Pennell 18,918*, Sierra Gazachic, Barranca Colorada, 35 km. southwest of Minaca, dry rocky ledges, herb, alt. 2200–2400 m., Sept. 16–17, 1934 (ANS); *LeSueur 1211*, Chuchichupa, Aug., 1936 (F); *Pringle 1131*, Potero Mts., alt. 7300 ft., Sept. 10, 1886 (G); *Hartman 788*, Pilares, "Culantrio", Sept. 19, 1891 (G); *Pringle 1180*, near Chihuahua, cool hillsides, Aug. 26, 1887 (ANS, F, G, NY, US). SONORA: *Hartman 121*, Los Pinitos, alt. 6100 ft., Oct. 12, 1890 (G, NY, US); *Wright 834*, mountain ravine at Santa Cruz, Sept., 1851 (G, TYPE; ANS, G, M, NY, UC, ISOTYPES); *Mearns 1605*, summit of San Jose Mts., Aug. 3, 1893 (US); *S. S. White 3081*, Cañon de las Estacas, July 30, 1940 (G). SINALOA: *Pennell 20,103*, Cerro de la Sandia, northeast of Panuco, Carrizo, along stream on pineland, alt. 1800–1900 m., Aug. 29–30, 1935 (ANS); *Gentry 6266*, Sierra Surotato, Ocurahui, Pine Forest area, steep moist shady canyon slope with mixed dominants, alt. 6000–7000 ft., Sept. 1–10, 1941 (ANS, M, NY). FIG. 103.

The number 834 in the manuscript of Wright is an *Artemisia*. But it is known that Gray changed Wright's collection-numbers. The manuscript of the latter enumerates three collections of *Thalictrum:*

178. *Thalictrum*, Cummings' Creek, May 10, 1849.[1]
151. *Thalictrum*, hillsides of Coppermine Creek, 2–4 ft. tall, Aug. 4, 1851.[2]
639. *Thalictrum*, Mountain ravines at Santa Cruz, Sept. 23, 1851.[3]

At the Gray Herbarium there are three herbarium sheets of Wright's collections. The labels read as follows (Gray's handwriting is in italics, the printed caption in roman):

First specimen:

debile, Buckley ?
Thalictrum (n. sp.)
debile, Buck
Texas, Mr. Charles Wright.

Second specimen:

No. *833* C. Wright, Coll. N. Mex. 1851.
Thalictrum Fendleri, Engelm.

Third specimen:

No. *834* C. Wright, Coll. N. Mex. 1851.
Thalictrum Wrightii n. sp.
Santa Cruz, Sonora.

Comparing these with what Gray published in Pl. Wright. 2: 7 (269), 1853, it seems clear that these three specimens correspond respectively to Wright's field numbers 178, 151, 639.

104. T. FENDLERI Engelm., var. **sinuosum,** var. nov. *Planta* similis praecedenti, fructubus tamen *nervis* sinuosis. Floret Augusti mense.—MEXICO, CHIHUAHUA: *Goldman 125*, near Parral, alt. about 6500 ft., Sept. 20, 1898 (G, US). DURANGO: *Pringle 13,701*, Sandia Station, Oct. 12, 1905 (G, US); *Pennell 18,443*, north of Cueva, Metates, ravine at waterfall, alt. 2600–2650 m., Aug. 29–30, 1934 (ANS); *Nelson 4749*, El Oro to Guanacevi, Aug. 14–16, 1898 (G, TYPE and ISOTYPE: US, ISOTYPES). SAN LUIS POTOSÍ: *Schaffner 26*, ex convalli San Luis Potosí, in sylvis montibus San Miguelito, 1876 (G). FIG. 104.

[1] According to a manuscript at the Gray Herbarium (Johnston, I. M., Field Notes of Charles Wright, 1940), this is in Fayette County, Texas.
[2] Eodem. Grant County, New Mexico.
[3] Eodem. Sonora, Mexico.

105. T. Fendleri Engelm., var. **quadrinervatum,** var. nov. *Planta* pubescens verosimiliter metrum superans. *Stigma* ca. 1.5 mm. *Carpella* matura ventro ca. 5 mm. longo et ca. 2.5 mm. lato, *nervis* rectis vel sinuosis, ventrali convexiore quam dorsali. Nervi laterales carpelli vel tres vel singulus in utroque latere. Si tres, intermedius quam duo alii multo conspicuor et crassior est. *Flores* ignoti.—Mexico, baja california: *Wiggins & Demaree 4941*, Sierra San Pedro Martir, La Encantada, margins of meadow and adjacent slopes, alt. 2200 m., Sept. 20, 1930 (G, type; F, NY, UC, US, isotypes). Fig. 105.

106. T. polycarpum (Torr.) Watson, Proc. Am. Acad. **14:** 288, 1879, nec *T. polycarpum* Loret, Bull. Soc. Bot. Fr. **6:** 16, 1859, ut nomen provisorium alternativumque editum. *T. Fendleri* Engelm., var.? *polycarpum* Torr., Pac. R. R. Rep. **4:** 5 (61), 1857. *T. caesium* Greene, Fl. Franc. **3:** 309, 1892, nec *T. caesium* Blocki, Oest. Bot. Zeitschr. **37:** 286, 1888. *T. bernardinum* Greene, Fedde, Rep. Nov. Sp. **7:** 252, 1909. *T. campylopodum* Greene, l. c. 253, 1909. *T. coreospermum* Greene, l. c. 1909. *T. lentiginosum* Greene, l. c. 1909. *T. papyraceum* Greene, l. c. 1909. *T. ametrum* Greene, Muhlenbergia, **5:** 129, 1909. *T. latiusculum* Greene, l. c. 130, 1909. *T. magarum* Greene, l. c. 1909. *T. mendocinum* Greene, l. c. 129, 1909. *T. leiocarpum* Greene, l. c. 130, 1909, sicut nomen provisorium et alternativum praecedenti editum, nec *T. leiocarpum* Fries, Linnaea, **29:** 731, 1857 sive 1858. *T. polycarpum* Wats. var. *caesium* (Greene) Jepson, Fl. Calif. **1:** 530, 1921. *Planta* stolonifera omnino glabra, saepissime cauli, ramis, ramulis, fructubusque pruinosis vel glaucis vel caesiis, 50–150 cm. *Sepala* floris maris elliptica 3–5 mm. longa, foeminei orbicularia vel ovata vel saepius late ovata 1.0–2.5 mm. longa. *Filamenta* 5–6 mm. Antherae 2–4 mm., *acumine* 0.1–0.5 mm. *Stigma* 1.5–4.0 mm., filiforme. *Carpella* matura reflexa et valde compressa, nunquam costata, *stipite* (0.1)–0.2–(1.0) mm., ventre oborbiculari vel obovato-lanceolato vel saepius obovato 4–6–(8) mm. longo et (2.2)–3.5–(4.5) mm. lato, *nervis* lateralibus valde sinuosis ramosis anastomosantibusque, nervo ventrali interdum gibboso et semper quam dorsali convexiore. Floret Martio Aprili Majo et Junio.—California: *Chesnut 33*, Mendocino Co., Round Valley, alt. 440 m., May 20–June 20, 1898 (US, type of *T. mendocinum*); *Hasse*, Los Angeles, cañons, copses, Apr. 7–May 20, 1892 (US, type of *T. lentiginosum;* NY, isotype); *Heller 5855*, Lake Co., foothills of Mt. Sanhedrin, midway between Potter Valley and Hullville, July 14, 1902 (US, type of *T. latiusculum;* ANS, F, G, M, NY, isotypes); *S. B. Parish 3469*, San Bernardino Co., San Bernardino Mountains, Waterman Cañon, alt. 2000 ft., June 29, 1894 (US, type of *T. bernardinum;* M, isotype); *Orcutt*, Cuyamaca Mts., July, 1889 (US, type of *T.*

coreospermum); *Alderson*, San Diego Co., Witch Creek, April, 1894 (G-ND, type of *T. magarum;* G, photo of type); *Greene*, Chico, June, 1889 (G-ND, type of *T. caesium;* G, photograph of the type; UC, NY, isotypes); *L. E. Smith 306*, Shasta Co., Pitt River, May 28, 1913 (CA); *Bidwell*, Chico, Apr., 1879 (G); idem, May, 1878 (G); *Mrs. R. M. Austin*, Plumas Co., 1877 (G); *G. R. Vasey*, Sancelito, 1876 (G) [These last four specimens were authenticated by Watson]; *J. M. Bigelow*, Napa Valley, 1853–1854 (G, TYPE of *T. Fendleri* var.? *polycarpum;* NY, ISOTYPE). OREGON: *J. Howell*, Tualitin Plains, damp shady woods, along creek, July, 1877 (G); *J. Howell*, Sauvie's Island, July 1877 (F, type of *T. papyraceum*); *T. Howell*, along wooded streams, June 1881 (ANS, F, isotypes of *T. campylopodum*); *J. C. Nelson 1113*, Polk Co., W. Salem, woods near river, May 8, 1817 (G); *Eastwood & Howell 1487*, Douglas Co., 4 miles n. of Oakland, Apr. 13, 1934 (CA); *J. C. Nelson 2701*, Marion Co., State School, low ground, June 21, 1919 (G); *T. Howell*, Washington Co., by creeks, May, 1880 (F); idem, May, 1881 (ANS). FIG. 106, a–c.

The validity of *T. polycarpum* Wats. against the earlier *T. polycarpum* Loret has been argued pro and con many times. First, Greene noticed that there were two species called *T. polycarpum* and proposed the name *T. ametrum* to supersede *T. polycarpum* Wats. See Muhlenbergia, **5:** 129, 1909.

Second, L. C. Wheeler pointed out that *T. polycarpum* Loret, being a "nomen provisorium", was not validly published and thus could not invalidate a later homonym. Hence *T. polycarpum* Wats. was the correct name for the plant discussed. See RHODORA, **40:** 319, 1938. Third, Leon Croizat in Madroño, **7:** 1, 1943, in an article which I find much harder to follow through than Loret's "stiff french", contested the following points: 1, that it has not been made clear yet which of Loret's names, *T. polycarpum* and *T. multiflorum*, is a "nomen provisorium". 2, that *T. polycarpum* Loret was published as a synonym of *T. multiflorum* Loret, hence it is invalid (Amsterdam Code, Art. 40). 3, that *T. polycarpum* Loret is illegitimate, invalid, has been treated as a synonym on taxonomic grounds, and is an earlier homonym. Thus, according to Article 61, it renders illegitimate *T. polycarpum* Wats.

To this one may answer: 1, that both *T. multiflorum* Loret and *T. polycarpum* Loret are "nomina provisoria". If not, what is the meaning of "nomen provisorium"? There does not exist yet any officially published definition of that term, but in the

meantime we will take it in its common, everyday sense, hoping that it will not turn out that the 1935 International Congress had some esoteric meaning in mind. 2, that *T. polycarpum* Loret was not published as a synonym of *T. multiflorum* Loret, but as a "nomen alternativum". As ruled by the 1935 Congress, when names are published as "nomina alternativa" that does not render them invalid, but they are invalid if published as "nomina provisoria". Hence both *T. polycarpum* Loret and *T. multiflorum* Loret are not validly published. See Journ. Bot. **74: 75**, 1936. 3, that Article 61 mentions 4 conditions as necessary, that a homonym might be invalidated by another homonym, namely, that a homonym must be "*previously* and *validly* published for a group of the *same rank* based on a *different type* [italics mine]". *T. polycarpum* Loret does not fulfill the second of those conditions. Hence it cannot render *T. polycarpum* Wats. illegitimate. Article 61 speaks of "illegitimate names" and of names "treated as synonyms on taxonomic ground" only to specify that those two qualities are of no effect in the solution of the problem.

4 and 5, Cronquist and Weatherby, in two different articles published on the same page, both pointed out that "nomina provisoria" have been ruled out as not being validly published, and that the other half of Article 61, cited by Croizat, explicitly states that an earlier homonym must have been validly published in order to invalidate a later homonym. Now, Croizat himself admits that *T. polycarpum* Loret was not validly published, hence there is no reason why we should not keep *T. polycarpum* Wats. (Madroño, 7: 83, 1943).

The type of *T. Fendleri* Engelm., var. ? *polycarpum* Torr., is evidently not at New York, but at the Gray Herbarium. The text of the original description suggests that Coulter's plant should not be selected as a type. It is represented by two sheets, one at the Gray, the other at the National Herbarium, and both were originally labelled *T. dioicum* L. in John Ball's handwriting. The specimen at the Gray bears the following successive annotations in Gray's handwriting:

T. Fendleri
= *T. polycarpum* Torr. = *Fendleri* var.
T. polycarpum

Both specimens are densely pubescent individuals of *T. Fendleri* and they agree only in part with the original description of *T. Fendleri*, var. ? *polycarpum* Torr.

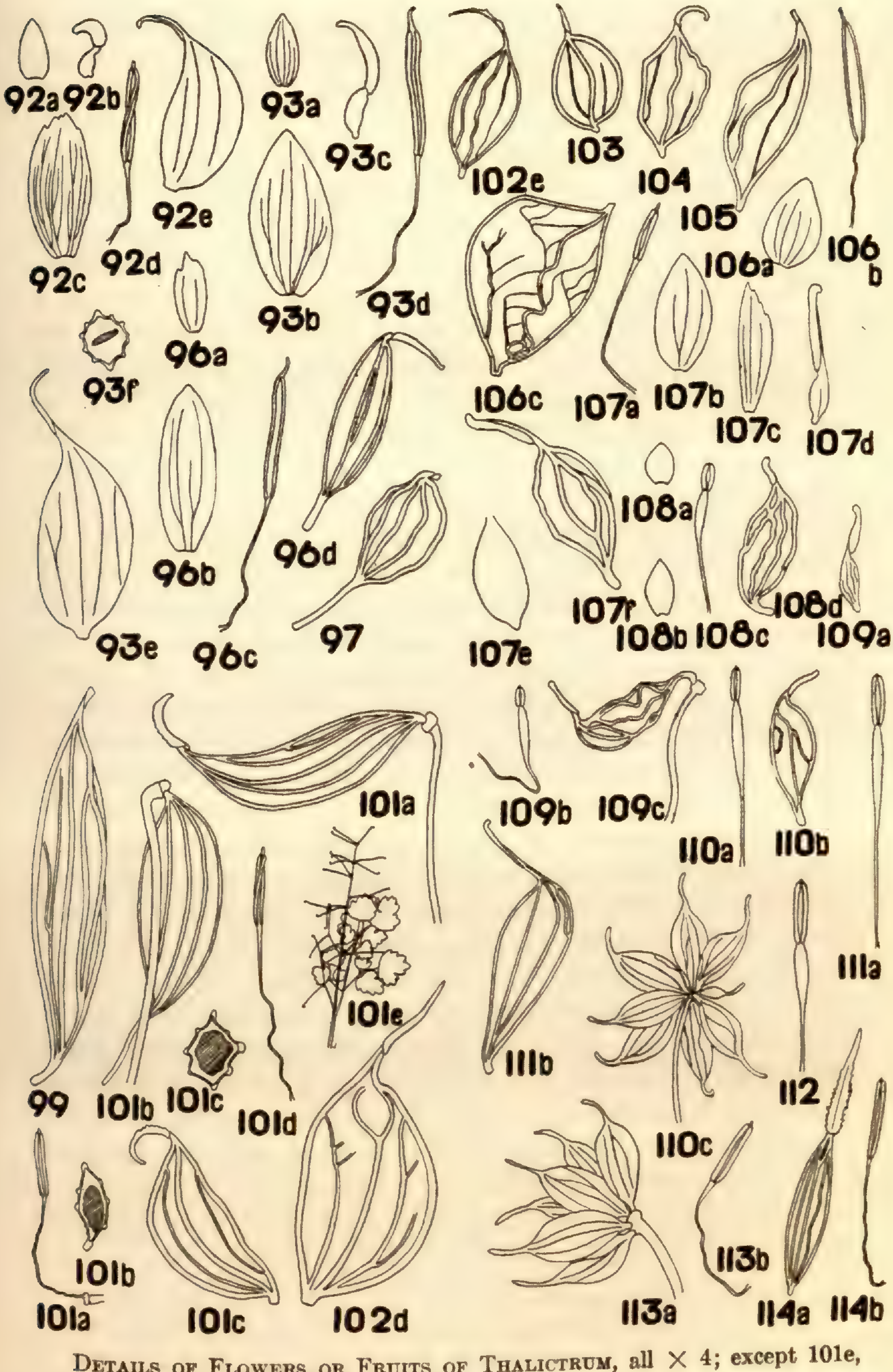
J. M. Bigelow's collection from San Antonita, New Mexico, is represented at the Gray Herbarium, at the New York Botanical Garden and at the Smithsonian Institution. All three are good ordinary *T. Fendleri* with a large, open and compound panicle and with pubescent fruits and leaflets. Although cited by Torrey, this collection does not agree at all with his description. The specimen at New York is labelled *Thalictrum Fendleri* Engelm. in Gray's handwriting and so is the specimen at the Gray Herbarium, but to this one Gray himself added later *fere var. Wrightii.* The third specimen is labelled *Thalictrum Fendleri* Engelm. in *Torrey's* handwriting. The New York sheet has the original label: *Camp B, San Antonita, Octo. 9, 1853, 963 Thalictrum sp., mt arroyos, JMB.*

At the Smithsonian Institution there is also a specimen of *T. polycarpum* which was first labelled *Thalictrum dioicum L. ?*, but Torrey changed it later to *polycarpum.* It was collected by E. Samuels in Sonoma Co., California. Although authenticated and agreeing with the original description, this specimen was not cited.

J. M. Bigelow's collection in Napa Valley is represented both at the Gray Herbarium and at the New York Botanical Garden. The New York specimen is identified *Thalictrum Fendleri* Engelm. in Torrey's handwriting. It is an immature pistillate plant. The label of the specimen at the Gray Herbarium reads as follows:

> *T. Fendleri. var.*
> **Thalictrum polycarpum**
> *Napa Valley Calif.* **n. sp. Torr.**
> **Bigelow**

Gray's handwriting is indicated by italics, Torrey's by boldface characters. This latter specimen is made up of a staminate inflorescence and a complete pistillate specimen with immature fruits. This Bigelow collection is very clearly *T. polycarpum* (Torr.) Wats. and agrees perfectly well with the original description of *T. Fendleri* Engelm. var.? *polycarpum* Torr. The specimen to be selected as a TYPE is evidently J. M. Bigelow's specimen at the Gray Herbarium, from the Napa Valley collection.



Details of Flowers or Fruits of Thalictrum, all × 4; except 101e, × ⅕, and 110c and 113a, these × 3.

(For explanation see end of paper.)

It is the only specimen which is at the same time cited, authenticated and agreeing well with the original description. It is also the most complete specimen and a well preserved one. This problem had already been outlined by L. C. Wheeler in RHODORA, **40:** 319, 1938, but no definite conclusion was given.

When Watson published his *T. polycarpum* he gave *T. Fendleri*, var.? *polycarpum* as a synonym "in part", without specifying which of Torrey's specimens were included. But the description of Watson eliminates both Coulter's and J. M. Bigelow's New Mexican collections; only the Napa Valley specimen agrees with the description. Thus *T. polycarpum* must be considered as a new status for *T. Fendleri* Engelm. var. ? *polycarpum* Torr. "in part *including the type specimen*" and there is no need to select a new type for *T. polycarpum*, but we must write *T. polycarpum* (Torr.) Wats.

L. C. Wheeler has expressed a different opinion in RHODORA, **40:** 317, 1938. To him it is not clear what of Torrey's variety WATSON included in his species. He thus naturally comes to the conclusion that one must write *T. polycarpum* Wats. and must select the type of that species independently from the type of Torrey's variety. To this we may say that Torrey's variety included two different species but his and Watson's descriptions agree well only with the Napa Valley collection. Watson had all three syntypes at hand and could easily settle that point.

Anyhow, there are at the Gray Herbarium 5 collections of *T. polycarpum* (Torr.) Watson authenticated by Watson himself. All agree well with the description, are within the range given, and were collected from 1876 to 1879. As a matter of fact, all 5 labels are entirely in Watson's handwriting. If one should follow Wheeler's opinion, one of those 5 specimens should be taken as the type. There is ample choice: one specimen is made up of 2 staminate inflorescences, another of a pistillate inflorescence, a third one of two pistillate and one staminate inflorescence, a fourth is the upper half of a plant with fully mature fruits, and the fifth one, the best specimen, a nearly complete plant with also fully mature fruits. The latter is the only specimen cited by Watson. Its label reads as follows:

Thalictrum polycarpum
(*T. Fendleri*, var. *polycarpum*, Torr.)

Damp shady woods along creeks,
near Tualitin Plains, Oregon.
J. Howell, July 1877.

Oddly enough, Wheeler selected J. M. Bigelow's Napa Valley collection as the type of *T. polycarpum*, the very type of *T. Fendleri* Engelm. var. ? *polycarpum* Torr. I see no reason to write *T. polycarpum* Wats. rather than *T. polycarpum* (Torr.) Wats., if the type of both units is the same specimen.

Sectio **Leucocoma** (Greene), stat. nov. Subg. or Sect. *Leucocoma* Greene, Leaflets, **2:** 54 and 55, 1910, subdivisio subgenerica cui deest determinator ordinis. *Leucocoma* (Greene) Nieuwland, Am. Midl. Nat. **3:** 254, 1914, ut genus, nec *Leucocoma* Rydb. Fl. Rocky Mts. 108, 1917. *Plantae* haud stoloniferae, sed *radicibus* fibrosis et numerosis. *Flores* polygami, sexu variabiles modo mirabili. *Sepala* erosa maris majora. *Filamenta* alba in nonnullis clavata. *Antherae* fere ovoideae ad oblongo-lineares, pallido-fuscae, *apice* truncatae vel *acumine* brevi. *Stigma* breve plus minusve bialatum. *Carpella* pariete membranacea, paullum si vero compressa, sed *nervis* rugosissimis saepius simplicibus et ternatis in latere. Species typica *T. canadense* sensu Greene i. e. *T. polygamum* Muhl. sensu auctoris sit.

This section is represented from Labrador to British Columbia and also in Newfoundland, Saint-Pierre et Miquelon and in the United States except in Mississippi, California, Utah and Nevada.

A key to the species of the section is not a workable one if it takes into account the full variation of each species. With more than a thousand herbarium sheets at hand one finds that occasional specimens will agree with the species to which they belong but for one character. To take such specimens into account would render the description so full of *perhaps*, *sometimes*, *rarely*, *or*, *even*, that they would not be descriptions any more. The following keys and descriptions are built upon specimens which I consider typical.

Clavis ad flores masculos ferentia

a. Pubescentia pilorum capitatorum vel rarissime deest; antherae 1.6–2.8 mm.; foliolae coriaceae et margine plus minusve revoluto.....107. *T. revolutum.*
a. Pubescentia vel deest vel pilorum uniseriatorum....*b.*
b. Antherae 0.5–1.4 mm.; filamenta apice dilatata sub antheris constricta....*c.*

c. Foliolae minores saepe integrae 0.5–1.5 cm. longae. Plantae glabrae. Filamenta 3.0–5.0 mm.....*d.*
d. Filamenta rigida. Planta rigida.....108. *T. macrostylum.*
d. Filamenta debilia. Planta reclinans.....109. *T. subrotundum.*
c. Foliolae fere omnes apice trilobatae 1.5–4.0 cm. longae. Plantae saepius pubescentes. Filamenta 3.5–8.0 mm.....*e.*
e. Antherae ca. 1 mm.; pedunculi gracillimi. Inflorescentia paniculata. Filamenta 3.5–5.0 mm..110. *T. polygamum.*
e. Antherae ca. 1.2 mm.; pedunculi crassiusculi; filamenta 5.0–8.0 mm.; inflorescentia subcorymbosa 111. *T. polygamum,* var. *hebecarpum.*
b. Antherae 1.5–3.2 mm.....*f.*
f. Antherae 1.5–2.5 mm. Plantae pubescentes....*g.*
g. Antherae 1.5–2.0 mm. Inflorescentia apice rotunda. 112. *T. polygamum,* var. *intermedium.*
g. Antherae 1.8–2.2 mm. Planta fastigiata foliolis coriaceis et margine revoluto. Inflorescentia apice acuta.....113. *T. dasycarpum.*
. Antherae 2.2–3.2 mm. Plantae nonnunquam glabrae 114. *T. dasycarpum,* var. *hypoglaucum.*

Clavis ad flores foemineas ferentia

a. Foliolae glabrae saepe integrae 0.5–1.5 cm. longae....*b.*
b. Stigma (0.7–) 1.0 (–1.5) mm. Foliolae interdum integrae, saepius apice trilobatae, saepius coriaceae.....108. *T. macrostylum.*
b. Stigma 1.0–2.0 mm. Foliolae fere omnes integrae, saepius membranaceae.....109. *T. subrotundum.*
a. Foliolae ca. 2.5 cm. et saepius inferne pubescentes....*c.*
c. Foliolae inferne sicut carpella dense pubescentes pilis capitatis. Foliolae coriaceae margine revolutae...107. *T. revolutum.*
c. Pubescentia, si adest, pilorum uniseriatorum....*d.*
d. Inflorescentia paniculata apice acuta....*e.*
e. Foliolae coriaceae pubescentes. Stigma 2–3 mm. 113. *T. dasycarpum.*
e. Foliolae saepius membranaceae. Stigma 2.5–5.0 mm. 114. *T. dasycarpum,* var. *hypoglaucum.*
d. Inflorescentia apice rotunda vel subcorymbosa....*f.*
f. Inflorescentia subcorymbosa, pedunculis crassiusculis 111. *T. polygamum,* var. *hebecarpum.*
f. Inflorescentia paniculata.....110. *T. polygamum.* 112. *T. polygamum,* var. *intermedium.*

Clavis ad fructus ferentia

a. Carpella omnia valde stipitata, reflexa et nervis valde sinuosis. Foliolae 0.5–1.5 cm. longae, glabrae et integrae. Stigma ca. 1.5 mm.....109. *T. subrotundum.*
a. Carpella nulla reflexa, vel alia reflexa, alia radiata, alia ascendentia....*b.*
b. Carpella omnia ascendentia. Receptaculum ad basem capitis fructuum....*c.*
c. Carpella apice acuminata et incurvata nervis valde sinuosis; stigma ca. 1.0 mm.; foliolae glabrae, inferne albicantes, ca. 1 cm. longae.....108. *T. macrostylum.*
c. Stigma 2–3 mm. Plantae dense pubescentes et foliolis ca. 2.5 cm. longis.....113. *T. dasycarpum.*
b. Receptaculum ad centrum capitis fructuum. Carpella recta....*d.*

d. Pubescentia pilorum rigidorum capitatorum, rarissime deest. Foliolae coriaceae margine valde revoluto
107. *T. revolutum.*

d. Pubescentia saepius adest pilorum flexuosorum et uniseriatorum. Foliolae saepius membranaceae....*e.*

e. Inflorescentia subcorymbosa pedunculis crassiusculis. Carpella ventre saepius oblanceolato
111. *T. polygamum*, var. *hebecarpum.*

e. Inflorescentia paniculata....*f.*

f. Venter carpelli saepius lanceolatum, nervo ventrali convexiore quam dorsali
114. *T. dasycarpum*, var. *hypoglaucum.*

f. Venter carpelli ovatum vel obovatum vel ellipsoideum vel lanceolatum, stipite 0.2–0.5 (–1.0) mm.
110. *T. polygamum.*
112. *T. polygamum*, var. *intermedium.*

107. T. REVOLUTUM DC. Syst. **1:** 173, 1817, nec *T. revolutum* Lievre, Oestr. Bot. Zeitschr. **23:** 254, 1873. *T. revolutum* DC., var. β *subglabrum* DC. Syst. **1:** 178, 1817. *T. purpurascens*, var. *ceriferum* Austin ex Gray, Man. Bot., ed. **5:** 39, 1867. *T. aristatum* Willd. ex Lec., Bull. Soc. Bot. Belg. **24:** 253, 1885, nomen. *T. graveolens* Muhl. ex Trel., Proc. Bost. Soc. Nat. Hist. **23:** 301, 1886, ex synonymis. *T. Cornuti* L., var. *macrostylum* Shuttlw. in Small & Heller, Mem. Torr. Bot. Club, **3:** 8, 1892, ut synonymon editum. *T. Cornuti* L., var. *brevifolium* Rugel in Small & Heller, l. c. 9, 1892, nomen ut synonymon editum nec *T. Cornuti* L., var. *brevifolium* Shuttlw. in Gray, Syn. Fl. North Am. **1,** part 1: 17, 1895. *T. amabile* Greene, Am. Midl. Nat. **2:** 294, 1912. *T. revolutum* DC., f. *glabra* [sic] Pennell, Bartonia, **12:** 12, 1931. *Planta* circa metralis, fere semper pubescens per foliolas inferne, sepala, pedunculos et ovaria. Aliter semper glabra. *Foliolae* coriaceae margine valde revoluto, saepius obovatae, *apice* trilobatae, *lobis* saepius rotundis. *Sepala* ovata vel oblanceolata 3–4 mm. longa, floris foeminei 2.0–3.5 mm. longa. *Filamenta* debilia paululum apice incrassata, sub antheris haud constricta interdum subclavata, 4.5–5.5 mm. *Antherae* oblongo-lanceolatae ad oblongo-lineares 1.7–2.8 mm., *acumine* 0.2–0.5 mm. *Stigma* 2.0–3.5 mm. alis saepius conspicuis et pilis minutissimis, in fructu saepius incurvatum. *Carpella* matura *stipite* 0.2–0.5 mm., ventre ellipsoideo ad lanceolato. *Receptaculum* ad centrum capitis fructuum. Floret ad meridiem Majo, sed ad Septentrionem et in montibus floret Junio vel interdum Julio.—QUEBEC: *J. Macoun 72,578*, Gaspé Co., Percé, Aug. 30, 1907 (C, G). MASSACHUSETTS: *Fernald & Weatherby 16,807*, Barnstable Co., Falmouth, roadsides in woods north of Wood's Hole, Sept. 20, 1918 (NE); *Rich*, Middlesex Co., Stoneham, rocky woods, June 18, 1894 (NE); *W. Boott*, south end of Mystic Pond, wood, July 4, 1869 (G); *Pease 3782*, Essex Co., N. Andover, Boston Hill, dry pastures, June 28, 1904 (NE). RHODE ISLAND: *J. F. Collins*, Providence, n. of Cat Swamp, June 26, 1892 (G);

Lownes & Collins, Washington Co., South Kingston, July 11, 1930 (NE); *Fernald 9518*, Providence Co., Lincoln, Wilbur Crossing, dry thicket, July 17, 1913 (NE). CONNECTICUT: *Weatherby 6779*, Tolland Co., Somers, roadside thicket, June 22, 1935 (NE); *Bissell 54*, Hartford Co., Southington, dry rocky ground, frequent, June 15, July 10, July 30, 1893 (NE); *Woodward*, Franklin, dry bank, June 24, 1911 (G). NEW YORK: *Muhlenberg 795* (ANS); *Eames, Randolph & Wiegand 12,062*, Ontario Co., Phelps-Waterloo townline, Sept. 6, 1919 (G); *Burnham*, Warren Co., Lake George village, Sept. 3, 1897 (G); *House 25,018*, Albany Co., so. of Kamer, sand plains, Aug. 24, 1937 (NY). NEW JERSEY: *Austin*, Closter, June 5–15 (G, type of *T. purpurascens* var. *ceriferum*); *Austin*, Closter, 1866 (G, paratype of *T. purpurascens* var. *ceriferum*); *Austin*, Ne. New Jersey, uplands (G, paratype of *T. purpurascens* var. *ceriferum*); *Austin*, Palisades, 1858 (G, F); *Austin*, Closter, June, 1865 (F, paratype of *T. purpurascens* var. *ceriferum*). PENNSYLVANIA: *Pennell 8956*, Chester Co., Nottingham, serpentine barren, Sept. 14, 1916 (ANS, paratype of *T. revolutum*, f. *glabrum*); *Small*, Perry Co., vicinity of Marysville, June 25, 1888 (F); *Schweinitz*, Bethlehem (ANS); *Meredith*, Bucks Co., 1½ miles west of Union School House, open hedge-row, May 30, 1921 (G); *Muhlenberg 598* (Willdenow Herb., paratype of *T. polygamum* ?) DELAWARE: *Commons*, near Centreville, banks of streams, July 5, 1872 (ANS). MARYLAND: *J. D. Smith*, Garrett Co., Oakland, copses, borders of glades, July 13, 1883 (G). DISTRICT OF COLUMBIA: *Steele*, Chain Bridge flats, July 4, 1904 (US); *L. F. Ward*, June 23, 1878 (F, NY). WEST VIRGINIA: *Millspaugh 336*, 1890–1899 (F); *Gilbert 482*, Cabell Co., Pleasant Valley, open oak woods, July 8, 1936 (G, NY); *Core*, Monongalia Co., near Halleck, July 11, 1931 (G). VIRGINIA: *Fernald & Long 11,835*, Greensville Co., Emporia, rich deciduous wooded slope, May 11, 1940 (G); *Small*, Smyth Co., Walker Mountains, Shannon Gap, alt. 3000 ft., June 20, 1892 (F, G, M); *Churchill*, Rockbridge Co., Glasgow, June 1, 1891 (M). NORTH CAROLINA: *Small & Heller 264*, on the road between Blowing Rock and Shull's Mill, June 16–17, 1891 (ANS, F, M, NY, US); *Churchill*, Polk Co., Tryon, open hillsides, May 22, 1899 (M); *Churchill*, Madison Co., Hot Springs, June 1, 1899 (M). SOUTH CAROLINA: Saint Andrews, May, 1855 (G); *B. E. Smith*, Darlington Co., Lauther's Lake, low land, Aug. 3, 1940 (NC); *House 2225*, Oconee Co., Fort Hill, May 24, 1906 (BG, M, US). GEORGIA: *Leeds 2013*, Lumpkin Co., Blood Mt., Flatrock Gap, moist edge of exposed rock slide, June 2, 1934 (ANS); *Cuthbert 516 & 551*, Augusta, May 17, June 18, 1901 (NY); *Pollard & Maxon 521*, Dougherty Co., vicinity of Albany, Aug. 13, 1900 (G, US); *Churchill*, Chickamauga Park, near Lookout Mountain, May 8, 1906 (G, M); *Green*, Macon

(ANS, labelled *T. Cornuti*, var. *brevifolium* Rugel and paratype of *T. macrostylum*). FLORIDA: *Chapman* (G, NY); *Rugel*, prope St. Marks, inter frutices (Magnolia-Chamaerops), jun. 1843 (NY, labelled *T. Cornuti* var. *macrostylum* and paratype of *T. macrostylum*). ONTARIO: *J. Macoun 23,615*, Amherstburg, July 31, 1901 (G). OHIO: *Wilkinson 228*, Mansfield, waste places, June, Aug., 1895 (US, type of *T. amabile*); *Moseley*, Erie Co., Perkins, July 8, 1895 (G); *Lea*, Hamilton Co., June 14, 1838 (ANS). INDIANA: *Peattie*, Porter Co., Tremont, sandy field and along roads in the dunes, Sept. 4, 1920 (G). KENTUCKY: *Smith & Hodgdon 3865*, Monticello, Beaver Creek, rich wooded slopes, July 12–14, 1937 (G); *Short*, Lexington (ANS); *McFarland & James 5*, Whitley Co., 3 miles west of Corbin, low swampy field near edge of ditch, July 25, 1941 (M). TENNESSEE: *Ruth 1803*, Knoxville, groves and open woods, June, 1897 (NC, NY); *Svenson 10,564*, Cheatham Co., Pegram, dry shale, Aug. 22, 1940 (BG); *Eggert*, Dickson Co., near White Bluff, Aug. 19, 1897 (M). ALABAMA: *Eggert*, De Kalb, Collinsville, June 29, 1897 (M). ILLINOIS: *Gleason 9131*, Champaign Co., Champaign, wet prairie along railway, July 3, 1940 (NY); *Gleason*, Urbana, wet woods, June 27, 1906 (G); *Greenman 3683*, vicinity of Chicago, June 15, 1911 (G). MISSOURI: *Standley 9802*, Webster Co., vicinity of Rogersville, thin woods, Sept. 3, 1912 (US); *Letterman*, near Allenton, 1893 (ANS, M, US); *Emig 268*, Elmont, May 23, 1914 (M). FIG. 107, a–f.

The specimen from Percé is only tentatively identified as *T. revolutum*. It is from far out of range and in a very different floristic area.

The correct name for this species is still unsettled. Two nomina dubia antedate *T. revolutum* and when better understood might replace it: *T. purpurascens* L. and *T. pubescens* Pursh.

108. T. MACROSTYLUM Small & Heller, Mem. Torr. Bot. Club, **3**: 8, 1892. *T. Cornuti* L., var. *brevifolium* Shuttleworth in Gray, Syn. Fl. North Am. **1,** part 1: 17, 1895, nomen nudum, nec *T. Cornuti* L., var. *brevifolium* Rugel in Small & Heller, Mem. Torr. Bot. Club, **3:** 8, 1892. *T. polygamum* Muhl., var. *macrostylum* (Small & Heller) Robinson in Gray, Syn. Fl. North Am. **1,** part 1: 17, 1895. *Planta* omnino glabra circa metralis. *Foliolae* saepius coriaceae, obovatae vel oblongae, interdum integrae, saepius apice trilobatae, infernae nonnunquam fere albae, 0.7–1.5 cm. longae. *Inflorescentia* maris conferta et subcorymbosa. Inflorescentia foeminea variabilis. *Sepala* floris masculi 1.5–2.0 mm., foeminei ca. 1 mm. *Filamenta* 3–4 mm., rigida, paullo clavata et sub antheris constricta. *Antherae* 0.5–1.2 mm., oblongae vel oblongo-lanceolatae, *acumine* brevissimo. *Stigma*

(0.7)–1.0–(1.5) mm., alis obscuris. *Carpella* matura haud compressa, nec costata, abrupte stipitata et apice incurvato, *stipite* ca. 0.5 mm., ventro ca. 3 mm. longo et 1.5 mm. lato, *nervis* rugosissimis et nonnunquam sinuosis. *Receptaculum* ad basem capitis fructuum. Floret Junio, Julio et Augusto.—Virginia: *Fernald & Long 9050*, Henrico Co., west of Elko Station, sphagnous springy swales bordering Whiteoak Swamp, Aug. 17, 1938 (G); idem *8711*, July 23, 1938 (G, M); idem *8710* (G); *Fernald, Long & Smart 5778*, on headwaters of Blackwater River, about 3 miles southeast of Petersburg, swampy woods, June 25, 1936 (G); *L. F. & F. R. Randolph 520*, Princess Anne Co., Pungo, open swampy land along West Neck Creek, June 29, 1922 (G). North Carolina: *Small & Heller*, Catawba Co., n. of Hickory, swamp, June 25–26, 1891 (NY, type and isotypes of *T. macrostylum;* F, isotypes); idem *428* (ANS, NY); *Rugel*, Swanano, in pratis vallis, Aug., 1841 (G, *T. Cornuti* var. *brevifolium*); *Heller 1015*, Catawba Co., near Hickory, June 23, 1893 (ANS, F, G, M, NY, US); *Biltmore Herbarium 11,024*, Flat Rock, low grounds, June 6, 1905 (NY, US); *Wiegand & Manning 1216*, Martin Co., June 21, 1927 (G); *Godfrey 4384*, Beaufort Co., Washington, marsh, June 9, 1938 (G); *Godfrey 4375*, Hyde Co., Swanquarter, June 9, 1938 (G); *Godfrey 4449*, Cartaret Co., Newport, marsh, June 10, 1938 (G); *House 4318*, Pisgah Forest, alt. 2500 ft., June 29, 1909 (US); *Peattie 1317*, Polk Co., The Shoals, low wet woods, Aug. 20, 1921 (F); *Peattie 1313 & 1313A*, Polk Co., east of Columbus, edge of a *Magnolia virginica* swamp, Aug. 20, 1921 (NC).

The two herbarium sheets on which Small and Heller picked up the two synonyms given in the original description belong to *T. revolutum* DC.

109. T. **subrotundum,** sp. nov. *Planta* omnino glabra, 1–2 m. alta, nonnunquam debilis ut in proximis innixa est. *Foliolae* integrae membranaceae, interdum coriaceae, orbiculares vel ovatae vel obovatae vel ellipticae interdum lanceolatae, 0.5–1.5 cm. longae. *Inflorescentia* paniculata et plus minusve foliosa. *Filamenta* debilia 3.5–5.0 mm., paullulum apice clavata et sub antheris constricta. *Antherae* ca. 0.75 mm. *Stigma* 1–2 mm., in fructu inflexum. *Carpella* matura conspicue reflexa, *stipite* ca. 1 mm., ventre obovato, *nervis* sinuosissimis et gibbosis. Floret Junio.—South Carolina: *Gibbes*, Georgetown, Apr., 1857 (NY); *Gibbes*, Summerville, May 25, 1855 (NY); *Godfrey & Tryon 1401*, Berkeley Co., 8 miles southwest of Moncks Corners, swampy shrubby peaty woods, Aug. 11, 1939 (G, M, NY); *Godfrey & Tryon 121*, Georgetown Co., 4 miles west of Georgetown, creek-bottom through rich lowland woods, June 27, 1939 (G, NY); *Eggert*, Aiken Co., sandy swamps, Aug. 8, 1898 (M); *Godfrey & Tryon 584*, Berkeley Co., 3 miles southeast of Pine-

ville, rich wooded slope, July 14, 1939 (G, NY). GEORGIA: *J. Davis 1860*, Winnette Co., Stone Mountain, June 18, 1921 (M); *Harper 1380*, Pulaski Co., se. of Hawkinsville, wet shady woods at base of sand-hills of Ocmulgee River, June 27, 1902 (NY, TYPE; G, M, US, ISOTYPES); *P. M. Way 9*, near Tallapoosa, July, 1900 (US); *Harper 1867*, Montgomery Co., near Ochwalkee, dry woods along Oconee River, July 1, 1903 (F, G, M, NY, US); *Harper 1063*, Dooly Co., in shaded limesink near Flint River, July 11, 1903 (M); *Eggert*, De Kalb Co., hill north of Stone Mountain, July 24, 1897 (M); *Harper 1160*, Lee Co., in shaded limesink east of Muckalee Creek, Aug. 2, 1902 (NY, US). FLORIDA: *Berg*, near Tallahassee (NY). ALABAMA: *Earle*, Lee Co., Camp Hill, June 23, 1897 (M, NC, NY); *Harper 3525*, Autauga Co., about 2 miles southeast of Booth, swamp of Bridge Creek, June 15, 1936 (ANS, BG, F, G, M, N-ND, NY, US). FIG. 108, a–d.

110. T. POLYGAMUM Muhl. ex Sprengel, Syst. Veg. **2:** 671, 1825. *T. polygamum* Muhl. Trans. Amer. Phil. Soc. **3:** 172, 1793, ut nomen nudum. *T. corynellum* DC. Syst. **1:** 172, 1817. *T. divergens* Link, Enum. Hort. Berol. **2:** 92, 1822. *T. hirsutum* Mertens ex Lec. Bull. Soc. Bot. Belg. **24:** 264, 1885, nomen nudum, nec *T. hirsutum* Willd. ex Lec. l. c. 280, 1885, pariter nudum. *T. leucostylum* Link ex Lec. l. c. 285, 1885, nomen nudum. *T. pubescens* Nuttall ex Trel. Proc. Bost. Soc. Nat. Hist. **23:** 301, 1886, nomen ex synonymis nec *T. pubescens* Pursh, Fl. Amer. Sept. **2:** 388, 1814, nec *T. pubescens* Schleich. ex DC. Syst. **1:** 174, 1817. *T. altissimum* Greene, Leaflets, **2:** 58, 1910, nec *T. altissimum* Wender, Flora, **9:** 358, 1826, nec *T. altissimum* Thomas ex De Massas, Ann. Sc. Nat. ser. 2, **9:** 369, 1838. *T. Bissellii* Greene, l. c. 55, 1910. *T. hepaticum* Greene, l. c. 59, 1910. *T. Mortoni* Greene, l. c. 57, 1910. *T. perelegans* Greene, l. c. 59, 1910. *T. setulosum* Greene, l. c. 56, 1910. *T. glaucodeum* Greene, l. c. 54, 1910. *T. tortuosum* Greene, Ott. Nat. **24:** 54, 1910, nec *T. tortuosum* Jord., Diagn. **1:** 38, 1864. *T. praealtum* Greene, Leaflets, **2:** 89, 1910. *T. perpensum* Greene, Amer. Midl. Nat., **2:** 295, 1912. *Thalictrum Cornuti* L., var. *stipitum* Farwell, Pap. Mich. Acad. Sci. Arts & Lett. **26** (1940)**:** 11, 1941. *Planta* statura variabili, saepius pubescens. *Pubescentia* pilorum uniseriatorum flexuosorum. *Foliolae* membranaceae variabiles (1.0)–2.5–(7.5) cm. longae, obovatae vel oblongae, apice trilobatae lobis integris. *Inflorescentia* paniculata, apice rotunda, *pedunculis* tenuibus. *Filamenta* rigida 3.5–5.0 mm., *apice* clavata et sub antheris constricta. *Antherae* saepius oblongae ca. 1.0 mm. long. *Stigma* 0.5–2.0 mm., alis obscuris et pilis crassiusculis. *Carpella stipite* 0.2–1.0 mm., ventre saepius ovato vel obovato vel ellipsoideo, *nervis* raro parum sinuosis. Floret Junio, Julio et Augusto.—NEWFOUNDLAND: *Fernald, Long & Fogg 269*, Bay of Islands, southern slope of Lark Mountain,

peaty and turfy subalpine meadows, Sept. 1, 1926 (G); *Howe & Lang 1006*, Bay St. George, Aug. 5–7, 1901 (G); *H. Bishop 319*, near Bonne Bay, Neddy Harbor, wooded banks of stream, Aug. 28–30, 1928 (G). "Canada": *Kalm* [?] (Linnaean Society Lond., paratype of *T. dioicum;* G, photograph). Saint-Pierre et Miquelon: *L.-Arsène 264*, Chapeau de Miquelon, 31 juil., 1901 (G); *L.-Arsène 239*, Langlade, vallée de la Belle-Rivière, août, 1901 (G). Quebec: *Victorin, Rolland, Brunel & Rousseau 17,347*, Percé, sur les corniches de conglomérat, 24 juil., 1923 (G); *J. Macoun 66,630, 66,631 & 66,632*, Cap à l'Aigle, Aug., 1905 (G); *Senn 396*, near Wakefield Lake, streamside, July 24, 1938 (G). Prince Edward Island: *J. Macoun 869*, Tignish, July 25, 1888 (G-ND, type of *T. glaucodeum;* G, photographs of same); *J. Macoun*, Mt. Stewart, July, 1888 (US); *Fernald, Bartram, Long & St. John 7493*, Mt. Stewart, springy ditch by railroad, July 30, 1912 (G). New Brunswick: *Rousseau & Bonin 32,047*, junction of Restigouche and Matapedia Rivers, gravelly banks, July 16, 1929 (G); *Chadbourne*, King's Co., Rothesay, July–Aug., 1883 (G); *Fowler*, Kent Co., Bass River (F). Nova Scotia: *J. Macoun 19,006*, Cape Breton Island, Baddeck, thickets, July 28, 1898 (G-ND, type of *T. tortuosum;* G, photographs of the same); *Fernald & Long 23,853*, Yarmouth Co., Parr Lake, thicket at upper border of cobbly beach, Aug. 12, 1921 (G); *Fernald & Long 23,852*, Digby Co., Little Meteghan Lake, thicket, Aug. 9, 1921 (G); *Perry, Wetmore, Hicks & Prince 10,140*, Antigonish Co., Salt Springs, along brook, Sept. 11, 1925 (G). Maine: *B. L. Robinson*, Rangeley Lakes, Middle Dam, Aug. 2, 1903 (G); *Fernald*, Penobscot Co., Orono, rocky bank, July 12, 1892 (G, NE); *Fernald 3*, Aroostook Co., St. Francis, low thickets, Aug. 15, 1893 (G). New Hampshire: *A. H. Moore 4032*, Coos Co., Colebrook, foot of Lombard Hill, east of Monadnock House, shaded roadside, July 20, 1907 (G); *Batchelder*, Cheshire Co., Richmond, shore of Sandy Pond, Sept. 3, 1916 (NE). Vermont: *Day 11*, Bennington Co., Manchester, June 25, July 22, 1898 (G, NE); *Williams*, Ripton, Bread Loaf Inn, July 7, 1908 (G). Massachusetts: *Churchill*, Berkshire Co., Sheffield, low ground, July 19, 1920 (NE); *Fernald & Long 18,470*, Barnstable Co., Sandwich, Spring Hill, low thicket bordering maple and *Chamaecyparis* swamp, Aug. 9, 1919 (NE); *Bicknell 4329*, Martha's Vineyard, Chilmark, July 3, 1913 (NE, NY). Rhode Island: *Fernald*, Kent Co., Warwick, sandy meadow, June 25, 1910 (G, NE); *Ware & Fernald*, Washington Co., Westerly, boggy swale north of Babcock Pond, Aug. 31, 1919 (NE); *Leland*, East Providence, July 4, 1929 (NE). Connecticut: *Bissell*, Southington, July, 1897 (G-ND, fragment from type of *T. Bissellii;* G, photograph of this fragment); *Meredith*, Litchfield Co., Kent Falls, brookside, Aug. 2, 1927

(ANS); *Wright*, Meriden, July 21, 1879 (NE). NEW YORK: *Lucy 227*, Chemung Co., Elmira, July 2, 1896 (G-ND, fragments of the type of *T. Cornuti*, var. *stipitum;* G, photographs of these fragments); *Muhlenberg 794*, western New York (ANS, *T. polygamum* !); *Fernald, Wiegand & Eames 14,291*, Oswego Co., Oswego, Mud Pond, swampy woods and thickets overlying Silurian sandstones, Aug. 23, 1922 (G). NEW JERSEY: *E. B. Bartram*, Sussex Co., Rosenkraus Run, July 16, 1917 (G); *Long 46,326*, Hunterdon Co., s. of Van Syckles, along Mulhockaway Creek, open alluvial thicket, June 28, 1935 (ANS); *Long 54,624*, Salem Co., ca. 1 mi. s. s. w. of Friendship, along branch of Muddy Creek, low woods, June 30, 1940 (ANS). PENNSYLVANIA: *Muhlenberg 597* (Willdenow Herb., TYPE of *T. polygamum*); *Nuttall*, Philadelphia (ANS, G, *T. pubescens* Nuttall); *Pierron*, Westmorland Co., Aug. 5, 1877 (F); *Harshberger*, head of Naomi Pines Lake, wet places in woods, July 29, 1904 (G); *Schweinitz*, Bethlehem (ANS). DELAWARE: *Canby*, Wilmington, 1866 (G). MARYLAND: *J. D. Smith*, Garrett Co., July 30, 1879 (US). WEST VIRGINIA: *MacElwee*, Marion Co., west of New England, along stream in ravine, July 28, 1907 (ANS); *E. E. Berkeley*, Summer Co., near mouth of Blue Stone River, July 16, 1930 (G); *Greenman 368*, Randolph Co., Big Run, Sept. 14, 1904 (F, G). VIRGINIA: *Fernald & Long 8267*, Surry Co., James River, rich alluvial woods and thickets back of sand-beach below Sunken Meadow Beach, June 14, 1938 (G); *Fogg 14,744*, Giles Co., 0.5 mi. e. of Bane, wooded slope along Walkers Creek, June 29, 1938 (G); *Allard 732*, Fauquier Co., western slopes of Bull Run Mountains, brook-bank near Hopewell Gap, June 30, 1935; *W. Palmer 22*, Bedford Co., Peaks of Otter, alt. 2500 ft., July 28, 1906 (BG, US); *Small*, Smyth Co., at falls of Holston, alt. 2050 ft., July 9, 1892 (F, G, M, US). NORTH CAROLINA: *Ashe*, Grandfather Mt., July 9, 1893 (NC); *Blomquist 237*, Durham Co., river banks, May 3, 1932 (G); *Biltmore Herbarium*, Madison Co., near Marshall, banks of Big Ivy Creek, Aug. 8, 1898 (G, M, NY, US). GEORGIA: *Ruth 10*, Blue Ridge, swamps, July 10, 1900 (US). ONTARIO: *J. A. Morton 10,607*, Wingham, July 13, 1890 (G-ND, type of *T. Mortoni;* G, photographs of type); idem *865* (G-ND, isotype of *T. Mortoni;* G, photographs of same); *Umbach*, Elmira, swamps, July 13, 1899 (F); *E. L. Greene*, Strathroy, June 16, 1909 (G-ND, type and isotypes of *T. perpensum;* G, photographs of the type and of one isotype); idem, June 12, 1909 (G-ND, paratype of *T. perpensum*). OHIO: *F. E. Leonard 87–112½*, Elynia, July 14, 1887 (US). INDIANA: *Friesner*, Floyd Co., New Albany, Aug. 23, 1923 (N-ND). KENTUCKY: *Smith & Hodgdon 3929*, Wayne Co., southwest of Monticello, Beaver Creek, shady ledge, July 12–14, 1937 (G); *Smith & Hodgdon 3695*, Rockcastle Co., between Berea and Mt.

Vernon, slough, July 8, 1937 (G, NY); *Short 2*, alluvium of the Kentucky River (ANS); *Lea 3*, Kenton Co., Banklick Creek, 1834–44 (ANS). TENNESSEE: *Kearney 602*, Cocke Co., near Lemon's Gap, Sept. 3, 1897 (G-ND, type of *T. perelegans;* M, NY, US, isotypes); idem *602½* & *603*, Sept. 8 (M, NC, NY, US); *Svenson 4050*, Morgan Co., Rugby, mossy banks of stream, Aug. 19, 1930 (BG). FIG. 110, a–c.

Thalictrum polygamum Muhl. is antedated by two other validly published names and perhaps by four. Although we know that this name is not the right one for the species, it seems preferable to keep it until we make sure of the right name to take.

Gray gives 1813 (Cat. Plant. Amer. Sept., p. 54) in his Synoptical Flora as the right date for the valid publication of *T. polygamum* Muhl. He considered the two words "smooth, polygamous" as a valid description. Actually these were not intended to be a description, but common names, that is "smooth meadow-rue, polygamous meadow-rue", as stated at the beginning of the Muhlenberg's Catalogue. The first valid publication is, then, Sprengel's in 1825, later than *T. corynellum* DC. 1817, *T. divergens* Link 1822, *T. pubescens* Pursh 1814, and *T. purpurascens* L. 1753.

111. T. POLYGAMUM Muhl., var. HEBECARPUM Fern., RHODORA, **10:** 49, 1908. *T. leucocrinum* Greene, Ott. Nat., **24:** 29, 1910. *T. zibellinum* Greene, l. c. 30, 1910. *T. labradoricum* Greene, l. c. 53, 1910. *T. terrae-novae* Greene, l. c. 52, 1910. *T. canadense* Miller, var. *hebecarpum* (Fern.) House, Bull. N. Y. State Mus. **254:** 346, 1924. *Planta* robustior saepius pubescens et sesquimetralis. *Inflorescentia* ampla subcorymbosa, *pedunculis* crassiusculis et nonnunquam incurvatis. *Filamenta* saepius 5.0–6.5 mm. conspicue clavata. *Antherae* ca. 1.2 mm. *Stigma* 1.5–3.5 mm. *Carpella* matura saepius oblanceolata. Floret Julio et Augusto.—LABRADOR: *H. Bishop 318*, Petty Harbor, 52° 25′ N., 55° 40′ W., sphagnous spruce woods, July 12, 1928 (G); *Fernald & Wiegand 3438*, Blanc Sablon, by brooks, Aug. 6, 1910 (G). NEWFOUNDLAND: *Robinson & Schrenk 187*, St. John's, Rennie's River, rocky banks, Aug. 4, 1894 (US, type of *T. terrae-novae;* ANS, F, G, NY, isotypes); *Fernald & Wiegand 3437*, Port Saunders, gravelly shore, Aug. 6, 1910 (G); *Fernald & Long 28,274*, Bard Harbor Hill, meadow below limestone escarpment, Aug. 21, 1925 (G). QUEBEC: *Williams & Fernald*, Témiscouata Co., Rivière du Loup, gravelly thicket by the Saint Lawrence, Aug. 2, 1902 (G, TYPE of *T. polygamum* var. *hebecarpum*); *Fernald, Bartram, Long & St. John 7492*, Magdalen Islands, Grindstone Island, Grindstone, wet clearing, July 22, 1912 (G);

Richardson 867, Lake Mistassini, wet meadows around springs and along rivulets, July 15, 1870 (C); *Churchill*, Terrebonne Co., Lac Tremblant, July 18, 1922 (G). PRINCE EDWARD ISLAND: *J. Macoun*, Mt. Stewart, Aug. 17, 1888 (G). NEW BRUNSWICK: *J. D. Smith*, Campobello Island, July 17–Aug. 20, 1888 (US, type and isotype of *T. leucocrinum*); *F. T. Hubbard*, Shediac Cape, rich meadow, with alder, July 21, 1914 (G); *Fowler 2*, St. Andrew's, July 3, 1900 (G); *Fernald & Long 13,641*, Carleton Co., Woodstock, gravelly river-thickets and bushy terraces, July 14, 1916 (G). NOVA SCOTIA: *J. Macoun 21,134*, Sable Island, not uncommon on the old land, July 24 & Aug. 2, 1899 (G, isotype of *T. zibellinum*); *Perry & Roscoe 217*, St. Paul Island, between Petries Pond and White Spring, Aug. 3, 1929 (G); *Long & Linder 21,255*, Yarmouth Co., Tusket, peaty spruce and alder thickets bordering swales, July 15, 1920 (G). MAINE: *C. A. E. Long*, Knox Co., Matinicus, swamp, July 6, 1919 (NE); *E. F. Williams*, Mt. Katahdin, Depot Pond, July 16, 1900 (G); *Williams, Collins & Fernald*, Aroostook Co., Presque Isle, July 12, 1902 (G, NE); *A. F. Hill 1481*, Hancock Co., Swans Island, July 8, 1914 (NE). NEW HAMPSHIRE: *Bullard*, Merrimac Co., Hill, roadside, July 12, 1933 (NE); *Pease 16,721*, Coos Co., Randolph, meadow, July 31, 1917 (NE); *C. F. Batchelder*, Rockingham Co., Fremont, edge of swampy woods, July 20, 1927 (NE). VERMONT: *E. F. Williams*, Addison Co., Ripton, Bread Loaf Inn, July 7, 1908 (NE); *Leland*, Windsor, meadows, June 27, 1880 (NE); *Kennedy*, Mount Holly, roadside, June 26, 1908 (G). MASSACHUSETTS: *F. T. Hubbard*, Essex Co., Manchester, wet rich loam by brook, July 15, 1913 (NE); *Sanford 750*, Bristol Co., Fall River, low ground, thicket, July 6, 1914 (NE); *Churchill*, Norfolk Co., Milton, July 2, 1899 (NE). NEW YORK: *Svenson 4578*, Greene Co., N. slope of Hunter Mt., margin of a cold brook, alt. 3500 ft., Aug. 24, 1931 (G); *Muenscher & Maguire 1179*, Franklin Co., hillside of Titus Mountain, roadside, July 13, 1930 (G); *Burnham*, Washington Co., southern W. Fort Ann, east of Tripoli, along Halfway Brook, July 2, 1897 (G). FIG. 111, a and b.

This variety is not a well cut unit but a rather well marked extreme commoner than the typical in northern parts of the range of the species. The following variety exhibits a similar behavior but the relation between the staminate and the pistillate plants has not been made yet. A third variety is perhaps worth recognition in the southern Appalachian upland (*T. altissimum* Greene and *T. perelegans* Greene).

112. T. POLYGAMUM Muhl., var. **intermedium,** var. nov. ? *T. viride* Greene, Leaflets, **2:** 56, 1910. *Planta* metralis pu-

bescens. *Foliolae* subcoriaceae et revolutae. *Inflorescentia* paniculata. *Antherae* 1.5–2.0 mm. RHODE ISLAND: *F. S. Collins 2354*, Bristol, July 12, 1918 (NE). CONNECTICUT: *Woodward*, Franklin, roadside, in rich moist soil, June 24, 1914 (G, TYPE and ISOTYPE of *T. polygamum* var. *intermedium;* NE, ISOTYPE); idem, June 26 (G); idem, July 1, 1915 (NE). MINNESOTA: *Coues*, 1873, Pembina (G). FIG. 112, a and b.

The type of *T. viride* Greene has not been seen by me.

113. T. DASYCARPUM Fischer & Lall. ex Fisch., Mey. & Lall. Ind. Sem. Hort. Petrop. **8:** 72, 1842. *T. Cornuti* L., var. β Fisch. Mey. & Lall. l. c. 72, 1842. *T. virginicum* Drege ex Lec., Bull. Soc. Bot. Belg. **24:** 323, 1885, nomen ex synonymis. *T. purpurascens* L., var. *dasycarpum* (Fisch. & Lall.) Trel., Proc. Bost. Soc. Nat. Hist. **23:** 301, 1886. *T. vegetum* Greene, Midl. Nat. **1:** 103, 1909. *T. albens* Greene, Amer. Midl. Nat. **2:** 292, 1912. *T. Moseleyi* Greene, l. c. 294, 1912. *T. Nortoni* Greene, l. c. 292, 1912. *T. Sandbergii* Greene, l. c. 293, 1912. *T. Wightianum* Greene, l. c. 293, 1912. *Leucocoma dasycarpa* (Fisch. & Lall.) Nieuwland, Amer. Midl. Nat. **3:** 324. 1914. *L. albens* (Greene) Lunell, Amer. Midl. Nat. **4:** 361, 1916. *L. vegeta* (Greene) Lunell, l. c. 1916. *Planta* metralis et pubescens. *Pubescentia* saepius densa pilorum uniseriatorum et flexuosorum. *Rami* et *folia* plus minusve conferta. *Foliolae* coriaceae, margine revoluto, oblongae, apice trilobatae, lobis acutis. *Inflorescentia* paniculata apice acuta. *Filamenta* capillaria et sub antheris paululum dilatata nec constricta, ca. 4 mm. *Antherae* 1.5–2.5 mm., oblongo-linearia, *acumine* 0.1–0.4 mm. *Stigma* 2–3 mm. *Receptaculum* ad basem capitis fructuum. *Carpella* matura *stipite* 0.1–0.3 mm., ventre saepius ovato, apice nonnunquam incurvato, *nervis* haud sinuosis. Floret Junio Julioque.—RUSSIA (cultivated): ex horto botanico petropolitensi (US, presumably from type colony in the garden). NORTH AMERICA: *Franklin Expedition* (G). ONTARIO: *C. F. Williamson 1949*, Fort William, river-banks, July 31, 1912 (ANS); *E. & D. M. Anderson 26,018B*, Timagami Region, Sandy Inlet, July 21, 1926 (G); *Pease & Ogden 25,038*, Manitoulin Island, Providence Bay, beach, July 5, 1935 (G); *Taylor, Hosie, Fitzpatrick, Losee & Leslie 2280*, Algoma District, Carp Lake, cedar-yellow birch association, July 25, 1935 (C); *Taylor, Losee & Bannan 904*, Thunder Bay District, Marie Louise Creek, along stream, Aug. 13, 1936 (C); *W. S. 62,298*, Moose Factory, July 15, 1904 (C). MICHIGAN: *W. F. Wight 118b*, Allegan Co., along Kalamazoo R. at Allegan, Sept. 11, 1902 (US, type, on two sheets, of *T. Wightianum*); *Barlow*, Marquette Co., Turin, by flowing water, July 8, 1901 (G); *Fernald & Pease 3307*, Houghton Co., southwest of Houghton, border of swamp, July 3, 1934 (G); *L. H. Bailey*,

near Lansing, June 13, 1886 (G). OHIO: *Webb 491*, Portage Co., Garrettsville, June 24, 1901 (G); *Moseley*, Erie Co., Oxford Tp., June 8, 1895 (US, type of *T. Moseleyi*). INDIANA: *Deam 57,871*, Wells Co., Bluffton, June 21, 1937 (G); *Deam 57,873*, Noble Co., Wolcottville, in a marsh, June 22, 1937 (G); *H. W. Clark 1870*, near Lake Maxinkuckee, June 26, 1901 (US). WISCONSIN: *H. W. Edmonds*, Vilas Co., Eagle River, 1926 (NY); *Fassett & Wilson 4301*, Buffalo Co., Fountain City, sandy R. R. embankment, Aug. 25, 1927 (G); *Schuette*, Brown Co., Dach's Creek, July 11, 1895 (G, NC). ILLINOIS: *Bebb*, Fountaindale, 1867 (G); *Vasey*, N. Ill. (G). MANITOBA: *Herriot 69,801*, Hamiota, June 22, 1906 (G). MINNESOTA: *Sandberg 1193*, Itaska Lake, wet places, July, 1891 (US, type and isotype of *T. Sandbergii*); *Ballard*, Nicolet Co., Swan Lake, June, 1892 (G); *Rosendahl 666*, Spring Grove, June 30, 1902 (G); *Arthur & Bailey B460*, Agate Bay, July 29, 1886 (G); *Stevens 186*, Muskoda, July 19, 1936 (G, UC). IOWA: *Pammel 596*, McGregor, Aug. 15, 1925 (G); *Pammel & Zimmerman 275*, Feinback, June 23, 1925 (G); *Ball 2*, Ames, July 18, 1896 (G). MISSOURI: *E. J. Palmer 18,991*, Atchison Co., near Watson, wooded slopes of loess hills, Sept. 4, 1920 (M); *Palmer & Steyermark 41,055*, Schuyler Co., Chariton River, low open woods, July 1, 1933 (M); *Palmer & Steyermark 41,242a*, Grundy Co., Trenton, woods along creek, July 4, 1933 (M); *Palmer & Steyermark 41,327*, Mercer Co., Saline, along north-facing wooded bluff of Little River, July 5, 1933 (M). NORTH DAKOTA: *Lunell*, Ramsay Co., Devil's Lake, in woods, July 16, 1902 (G-ND, type of *T. vegetum;* G, photographs); *Lunell*, Devil's Lake, July 1, 1905 (G-ND, paratype of *T. vegetum;* G, photographs); *Lunell*, Pierce Co., Pleasant Lake, thickets, June 19, 1901 (F, G); *Lunell*, McHenry Co., Towner, July 27, 1913 (F, US). SOUTH DAKOTA: *E. J. Palmer 37,636*, Washabaugh Co., Interior, in deep ravines, June 29, 1929 (G); *T. A. Williams*, vicinity of Brookings, June 17, 1896 (US); *Hayward 1594*, Black Hills, Hot Springs, mixed prairie, 1927 (F). NEBRASKA: *Tolstead 513a*, Valentine, along the banks of the Niobrara river, July 27, 1936 (G); *F. Clements*, St. James, June 24, 1893 (G, US); *Rydberg 1413*, on South Fork of Dismal River, in meadow, Aug. 14, 1893 (G). KANSAS: *J. B. Norton 5a*, Riley Co., 1896 (US, type of *T. Nortoni;* G, M, NY, US, isotypes); *M. White*, Cowley Co., June, 1898 (M); *Rydberg & Imler 44*, Miami Co., between Olathe and Pleasanton, June 18, 1929 (NY). SASKATCHEWAN: *Bourgeau*, 1857–1858 (G); *Herriot 69,801a*, Yorkton, damp thickets, July 6, 1906 (G). ALBERTA: *Herriot 69,800*, 6 miles e. of Edmonton, Aug. 24, 1906 (F, G); *E. H. Moss 2209*, Edmonton, amongst shrubs, July 6, 1931 (G). MONTANA: *R. S. Williams 418*, Great Falls, July 4 & July 20, 1886 (US). IDAHO: *Leiberg 1576*, Clarks Fork Valley, below Weeksville, alt.

650 m., Aug. 23, 1895 (G). WYOMING: *F. L. Bennett 827*, Black Hills, Sand Creek Canyon, shady flood-plain, alt. 3800 ft., June 24, 1938 (CA); *A. Nelson 8338*, Laramie Co., Badger, thickets on river-banks, July 1, 1901 (US). COLORADO: *Cowen 27 & 32*, Fort Collins, river-bank, alt. 5000 ft., July 1, 1895 (G, US). NEW MEXICO: *Standley 13,541*, Colfax Co., vicinity of Ute Park, meadow along creek, alt. 2200 to 2900 m., Aug. 22, 1916 (US); *Arsène & Benedict 17,431*, vicinity of Watrous, alt. 1950 m., Aug. 27, 1926 (CA, US); *Vasey*, Las Vegas, 1881 (US). ARIZONA: *Haugh*, Showlow, July 14 (US). FIG. 113, a and b.

A study of the polygamo-dioeciousness of this species was published by J. H. Schaffner in the Ohio Journ. Sci. **20:** 25, 1919.

114. T. DASYCARPUM Fisch. & Lall., var. **hypoglaucum** (Rydberg), stat. nov. *T. hypoglaucum* Rydb. Brittonia, **1:** 88, 1931. *T. macrostigma* Torr. ex Trel., Proc. Bost. Soc. Nat. Hist. **23:** 301, 1886, ut synonymon. *T. amphibolum* Greene, Fedde, Rep. Nov. Spec. **7:** 255, 1909. *T. dasycarpum* Fisch. & Lall., f. *hypoglaucum* Steyermark, RHODORA, **40:** 178, 1938. *Planta* saepius glabra. *Foliolae* saepius membranaceae. *Filamenta* 4–7 mm. *Antherae* 2.2–3.2 mm. *Stigma* 2.5–5.0 mm. *Receptaculum* ad centrum capitis fructuum. *Carpella* matura recta ventre lanceolato et *nervo* ventrali paullulum convexiore quam dorsali. Floret Majo et Junio. MISSOURI: *Standley 9298*, Greene Co., creek-bottom, vicinity of Ash Grove, Aug. 24, 1912 (US); *E. J. Palmer 36,684*, Johnson Co., Columbus, thickets, limestone hills and low woods, June 21, 1930 (G); *Bush 4*, Independence, June 26, 1895 (NY); *Steyermark 5938*, Nodaway Co., Parnell, dry open woods of Bunker Hill, June 20, 1938 (F). ARKANSAS: *E. Palmer 4*, between Fort Cobb and Fort Arbuckle, 1868 (NY, US, *T. macrostigma*); *Bush 2479*, Miller Co., woods, April 27, 1905 (M); *Fassett 19,760*, Hempstead Co., Hope, April 20, 1938 (G). LOUISIANA: *Hale*, Alexandria, 1840 (NY, US, *T. macrostigma*). SOUTH DAKOTA: *T. A. Williams*, Big Stone, Aug. 7, 1895 (US); *Hayward 135*, Spearfish Canyon, streamside, Aug. 1, 1926 (NY); *Brenckle 41–27*, east of Malette, river-bottom, in woods, June 16, 1941 (G). NEBRASKA: *Bates*, Red Cloud, June 11, 1906 (G); *E. S. Bacon*, Neligh, June 15, 1896 (G). KANSAS: *Hall*, Aug., 1870 (F); *Kellerman*, Manhattan, 1887 (M). OKLAHOMA: *G. W. Stevens 2086*, Washington Co., Copan, in moist shady woods, Aug. 15, 1913 (G); *Merrill & Hagan 546*, Platt National Park, June 3, 1935 (F, US); *G. W. Stevens 920*, Caddo Co., Hinton, bottoms of Devil's Canyon, June 15, 1913 (G, US); *J. Clements 11,583*, Comanche Co., Fort Sill, June 2, 1916 (G). TEXAS: *Hall 2*, Dallas, creek-banks, 1872 (NY, TYPE of *T. hypoglaucum;* F, G, M, US, ISOTYPES); *Eggert*, Mowie, woods, June 13, 1898 (M, NY, paratypes of *T. hypoglaucum*); *Lindheimer*,

Houston, April, 1842 (G, US); *Lewton 57*, Victoria Co., Victoria, March 23, 1905 (US). MONTANA: *Spragg 369*, Square Butte, canyons, July 15, 1901 (G); *Watson 7*, near Frenchtown, Aug. 4, 1880 (G, US); *M. E. Jones*, Ravalli, Middle Temperate Life Zone, alt. 3000 ft., July 14, 1909 (CA, UC). COLORADO: *Cowen 32*, Fort Collins, river-bank, alt. 5000 ft., July 1, 1895 (G); *Bethel*, Platte, July 31, 1916 (US). ARIZONA: *J. W. Lead 1511*, White Mountains, meadows, July 30, 1935 (US); *Rusby*, Oak Creek, 1883 (ANS, F, G, NY, US). WASHINGTON: *Kreager 377*, Box Canyon, Aug. 2, 1902 (US). BRITISH COLUMBIA: *J. Macoun 10,059*, Waterton Lake, thickets, July 27, 1895 (C); *J. Macoun 860*, Warm Springs, open places, July 5, 1890 (C). FIG. 114, a and b.

The carpel is not always perfectly closed in the genus *Thalictrum*. Near the base of the style the ventral nerves are free for a short distance and not infrequently there is a transition in the tissue of the carpel between the two ventral nerves. This is more easily seen in nearly mature fruits of *T. dasycarpum* Fisch. & Lall. var. *hypoglaucum*.

SPECIES HAUD SATIS COGNITA

115. T. DOMINGENSE Urban, Symb. Ant. **6:** 10, 1909. *Caulibus* tenuibus debilibus glabris; *foliis* ter usque semel pinnatis, *foliolis* ambitu suborbicularibus, subquadratis v. rhomboideis, raro usque infra medium 3-sectis, plerumque antice trilobis v. tricrenatis, glabris; *inflorescentiis* 1–2-floris; *sepalis* 3.5 mm. longis, albis, subtus violaceo-maculatis; *antheris* ovatis obtusis; *acheniis* sessilibus anguste lanceolatis, longitrorsum striatis, rostro uncato excepto cr. 3 mm. longis, 0.7 mm. latis.

Caules debiles, verisimiliter plantis aliis incumbentes, inferne usque 1.5 mm., medio vix supra 0.5 mm. crassi, teretes v. obtusanguli. *Stipulae* semiovatae, inferae usque 4 mm. longae, superiores sensim decrescentes, margine saepius dentatae, marcescentes. *Folia* inferiora usque 5 cm. longe petiolata; *foliola* 1.3–0.5 cm. diametro, lobis integris v. obsolete crenatis, lateralia 1–4 mm., terminalia usque 7 mm. longe petiolulata, supra obscure, subtus manifeste nervosa. *Flores* primarii (terminales) 10–12 mm., pallide viridia v. glaucescentia, supra obsolete, subtus manifeste nervosa. *Flores* primarii (terminales) 10–12 mm., secundarii (ex axilla folii simplicis v. bracteiformis abeuntes) usque 3.5 cm. longe pedicellati. *Sepala* non unguiculata, ovata v. ovalia, apice obtusa, 2 mm. lata. *Stamina* cr. 10; *filamenta* 2 mm. longa; *antherae* 0.5 mm. longae, muticae. *Carpella* 8–10; *stylus* evolutus; *stigmata* revoluta, stylo fere duplo longiora. *Achenia* stylo et stigmate persistente rostrata, striis circumcirca 7–8 prominentibus notata, tenuioribus hinc illinc interjectis.

Hab. in Haiti in Morne la Selle prope fontem Rivière Blanche de Jacmel 1800–1900 m. alt., m. Aug. flor. et fruct.: Christ n. 1848, 1848b.

Obs. Species hujus generis prima ex Antillis cognita, peculiaris, habitu foliorum *Th. Fendleri* Engelm. et *Th. Wrightii* Gray (ex. America sept.) in memoriam revocans, sed ab iis statura, inflorescentia, antheris, acheniis omnino diversa.

The preceding text is a copy of the original description. I have not seen any material of this species but it seems to differ from the continental species and probably belongs to the *Debilia*.

NOMINA DUBIA

T. PURPURASCENS L., Sp. Pl., **1:** 546, 1753. *T. dioicum* L., var. *α purpurascens* (L.) Provancher, Fl. Can. **1:** 5, 1862.

Of the type of this species in the herbarium of Linnaeus I have seen only the negative of a 35 mm. photograph. It is the upper half of a staminate plant collected in early bloom and looks pretty much like *T. revolutum* DC., but could be just as well *T. polygamum* Muhl.

T. PUBESCENS Pursh, Fl. Amer. Sept. **2:** 388, 1814. *T. polygamum* Muhl., var. *pubescens* (Pursh) K. C. Davis, Minn. Bot. Stud. **2:** 514, 1900.

The descriptions of *Thalictra* given by Pursh in his Flora are all more or less obscure to me and there are a few too many. I have seen five of Pursh's collections from the B. S. Barton herbarium. But that did not elucidate the problem. I suspect the type to be in the Delessert Herbarium and to belong either to *T. polygamum* Muhl. or to *T. revolutum* DC.

T. CAROLINIANUM Bosc and var. SUBPUBESCENS DC. Syst. **1:** 174, 1817, nec *T. carolinianum* Walter, Fl. Car., 157, 1788.

I have not seen any typical material of this species and its variety, and Lecoyer, who has seen the type specimens in the Delessert herbarium, considers them as synonyms of *T. polygamum* and *T. dasycarpum*, but his account is not very satisfactory. De Candolle's description is not very clear, but as the name *T. carolinianum* Bosc is already preoccupied by one of Walter's species, its correct interpretation is of little consequence.

T. MEGACARPUM Torr. Cat. Pl. Fremont Exped. 87, 1845. nomen nudum. *T. megacarpum* Torr. ex Rydberg, Fl. Rocky

Mts. 290, 1918. *T. occidentale*, var. *megacarpum* (Torr.) St. John, Fl. South. Wash. & adj. Idaho, 158, 1937.

The type of this species I have seen, but it greatly puzzles me. The foliage is typical of *T. occidentale* Gray var. *palouense* St. John; its inflorescence is pretty much like that of *T. confine* Fern. var. *columbianum* (Rydb.) nostrum, and the fruit, although closer to certain forms of *T. Fendleri* Engelm., also recalls that of *T. occidentale* Gray var. *typicum*. Such a specimen I consider as being either abnormal or of hybrid origin.

Other names have been discarded for various reason but none of them is likely to be entitled to supersede any of the names adopted in this paper. The list of these names follows:

Sect. CAMPTONOTUM Prantl, Nat. Pflanzenf. 3, **2**: 66, 1888.
Sect. CAMPTONOTUM, c. PETALOIDEA Prantl, l. c.
Sect. CAMPTOGASTRUM, c. PLATYCARPA Prantl, l. c.
T. MEXICANUM DC. Syst. **1**: 187, 1817, nomen provisorium.
T. CORNUTI L., var. MONOSTYLA [author?], Bot. Zeit. **3**: 218–219, 1845, nomen nudum.
T. PURPUREUM K. C. Davis, Minn. Bot. Studies, **2**: 513, 1900, nomen ex synonymis *Thalictri purpurascentis* L., nec. *T. purpureum* Schang ex Pall., N. Nord. Beitr., **6**: 42.

EXPLANATION OF FIGURES

FIGS 2–25 (p. 351), all × 4

FIG. 2. THALICTRUM HULTENII Boivin: stamen, *Everman 120*. 3. T. ALPINUM L., var. TYPICUM: a) sepal, *Blaisdell*, 1800; b) stamen, *Eugenius*, 26 julii, 1935; c) ovary, *Pease & Smith 25,761;* d) bract, peduncle and fruit, *Fidtz*, Aug. 11, 1910. 5. T. ALPINUM L., var. STIPITATUM Yabe: a) ovary, *Rock 17,865;* b) fruit, *Takemoto 591*. 8. T. BAICALENSE Turcz.: fruit, *Hsia 2310*. 9. T. BAICALENSE Turcz., var. MEGALOSTIGMA Boivin: fruit, *Fang 3619*. 10. T. PHILIPPINENSE C. B. Robinson: fruit, *Williams 1137*. 11. T. FILAMENTOSUM Max.: fruit, *Maximovicz*, Amur. 12. T. CLAVATUM DC.: a) peduncle and sepal, *Magee*, Lickstone; b) peduncle and anther, id.; c) seed, *Thaxter*, Cullowhee; d) section of fruit with seed, *Magee*, Lickstone; e) peduncle and fruit, id. 13. T. DECLINATUM Boivin: a) stamen, *Tsiang 5662;* b) fruit, id. 14. T. ACUTIFOLIUM (Hand.-Mazz.) Boivin: a) sepal, *Handel-Mazzetti 11,173;* b) stamen, id.; c) fruit, *Ko 52,821*. (The "c" of "14c" has been omitted by error.) 15. T. MICROGYNUM Lec.: fruit, *Henry 3932*. 16. T. UNGUICULATUM Boivin: a) sepal, *Tsiang 5662;* b) fruit, id. 17. T. GUEGUENII Boivin: a) sepal, *Tsang 23,486;* b) anther, id.; c) fruit, id. 18. T. MIRABILE Small: a) stamen, *Smith & Hodgdon 3928;* b) fruit, id.; c) fruit, *Earle 2212*. Fig. 18c is placed next to fig. 12e. 19. T. TUBERIFERUM Max.: fruit, [*?Watanabe*], Tagakushi-san. 20. T. WATANABEI Yatabe: fruit, [*?Watanabe*], Nanokawa, 1892. 21. T. CHIAONIS Boivin: a) stamen, *Chiao 18,719;* b) fruit, id. 23. T. ICHANGENSE Lec.: fruit, *Wilson 492*. 25. T. SPARSIFLORUM Turcz., var. TYPICUM: a) stamen, *Komarov 724;* b) fruit, id.

Figs. 26–43 (p. 371), all × 4

Fig. 26. T. sparsiflorum Turcz., var. Richardsonii (Gray) Boivin: fruit, *Kellogg 211*. 27. T. sparsiflorum Turcz., var. saxomontanum Boivin: fruit, *Nelson 6364*. 28. T. sparsiflorum Turcz., var. nevadense Boivin: fruit, *Heller 7056*. 29. T. aquilegifolium L.: a) section of fruit and seed, *Puget*, Chablais; b) peduncle and fruit, id. 30. T. aduncum Boivin: a) sepal, *Humbert 7448;* b) stamen, id.; c) ovary id.; d) peduncle and fruit, id. 31. T. rhynchocarpum Dill. & Rich.: a) stamen, *Linder 2116;* b) sepal, id.; c) ovary, id.; d) peduncle and fruit, *Schimper 472*. 32. T. innitens Boivin: a) sepal, *Swynnerton 352;* b) stamen, id.; c) ovary, id.; d) peduncle and fruit, *Owan 598*. 33. T. Chapinii Boivin: a) sepal, *Chapin 386;* b) stamen, id.; c) ovary, id.; d) peduncle and fruit, *Mearns 2320*. 34. T. impexum Boivin: a) sepal, *Curtis 839;* b) stamen, id.; c) ovary, id.; d) fruit, *Mearns 630*. 36. T. Steinbachii Boivin: a) sepal, *Steinbach 8869;* b) ovary, id.; c) fruit, id. 37. T. Steyermarkii Standley: a) ovary, *Standley 85,140;* b) fruit, id. 38. T. cincinnatum Boivin: a) ovary, *Steinbach 9231;* b) fruit, id. 39. T. macrocarpum Gren.: fruit, *Cosson*, Gourzy. 40. T. inuncans Boivin: a) sepal, *Fiebrig 2440;* b) ovary, id.; c) stamen, id. 41. T. Galeottii Lec.: a) stamen, *Galeotti 4541;* b) ovary, id.; c) fruit, id. Fig. 41a and 41b were drawn from actual specimens; fig. 41c from a photograph of the type. 42. T. Hintonii Boivin: fruit, *Hinton 6743*. 43. T. decipiens Boivin: a) ovary, *Herrera 1047a;* b) fruit, id.

Figs. 44–69 (p. 409) all × 4, except 51a and 63a, these × 1/5

Fig. 44. T. viridulum Boivin: fruit, *Seibert 204*. 45. T. panamense Standley: fruit, *Davidson 791*. 46. T. Macbrideanum Boivin: a) sepal, *Macbride 4466;* b) stamen, id.; c) ovary, id.; d) fruit, id. 47. T. Deamii Boivin: fruit, *Pringle 5071*. 48. T. grandifolium Wats.: fruit, *Jones*, Soldier Canyon. 49. T. Hernandezii Tausch: fruit, *Abbott 238*. 50. T. pachuense Rose: fruit, *Pringle 9678*. 51. T. Standleyi Steyermark: a) leaflet, *Steyermark 36,258;* b) fruit, *Standley 84,271*. 52. T. Johnstonii Stand. & Steyer.: a) ovary, *Heyde & Lux 2977;* b) stamen, *Johnston 1643;* c) nearly mature fruit, *Heyde & Lux 2977*. 53. T. lanatum Lec.: fruit, *Purpus 2714*. 54. T. Pennellii Boivin: fruit, *Pennell 18,505*. 55. T. parvifructum Boivin: fruit, *Pennell 19,555*. 56. T. strigillosum Hemsley: fruit, *Rose & Hay 6188*. 57. T. laeteviride Boivin: fruit, *Johnston & Muller 463*. 58. T. lasiostylum Presl: fruit, *Pennell 14,338*. 59. T. subpubescens Rose: fruit, *Pringle 11,917*. 60. T. pubigerum Bentham: fruit, *Pringle 4143*. 61. T. Conzattii Boivin: fruit, *Conzatti & Gonzalez 314*. 62. T. sessilifolium Boivin: *Nicolas*, Hacienda Alamos. 63. T. refractum Boivin: a) ramification of the petiole, *Cuatrecasas 9664;* b) fruit, id. 64. T. peninsulare (Brandegee) Rose: a) sepal, *Brandegee*, El Taste; b) stamen, id.; c) ovary, id.; d) peduncle and fruit, id. 65. T. gibbosum Lec.: peduncle and fruit, *Pringle 6511*. 67. T. rutidocarpum DC.: fruit, *Dombey*, Peru. Drawn from a photograph of the type. 68. T. vesiculosum Lec.: fruit, *Penland & Summers 1014*. 69. T. Nelsonii Boivin: a) ovary, *Nelson 1788;* b) fruit, id.

Figs. 70–89 (p. 429), all × 4

Fig. 70. T. podocarpum HBK.: a) ovary, *Killip & Smith 16,017;* b) peduncle and fruit, id. 71. T. Venturii Boivin: a) peduncle and stamen, *Venturi 10,026;* b) ovary, id.; c) fruit, id. 72. T. Lankesteri Standley: a) sepal, *Brenes 14,506;* b) stamen, id.; c) ovary, id.; d) fruit, *Lankester 337*. 73. T. Torresii Standley & Boivin: a) sepal, *Torres 187;* b) stamen, id.; c) ovary, id.; d) fruit, id. 74. T. guatemalense C. DC. & Rose: a) sepal, *Arsène 2810;* b) stamen, id.; c) ovary, id.; d) fruit, *Hayes*, Las Vacas. 75. T. Treleasii Boivin: a) sepal, *Langlassé 1061;* b) stamen, id. 76. T. peltatum DC.: a) sepal, *Hinton 4547;* b) stamen, *Alaman*, Mexico; c) ovary, *Hinton 4547*. Fig. 76b was drawn from the photograph of the type. 77. T. Pringlei Wats.:

a) sepal, *Pringle 2478;* b) stamen, id.; c) ovary, id.; d) fruit, *Leavenworth & Hoogstraal 989.* 79. T. ROSEANUM Boivin: a) sepal, *Pringle 7205;* b) stamen, id.; c) ovary, *Pringle 7448;* d) fruit, *Pringle 8261.* 80. T. ARSENII Boivin: a) sepal, *Arsène,* Jaripeo; b) stamen, *Arsène 5470;* c) fruit, id. 81. T. JALISCANUM Rose: a) sepal, *Hinton 4259;* b) stamen, id.; c) fruit, *Hinton 6557.* 82. T. CUERNAVACANUM Rose: a) sepal, *Pringle 6878;* b) ovary, id.; c) stamen. id.; d) peduncle and fruit, id. 84. T. TEXANUM (Gray) Small: a) sepal of pistillate flower, *Hall 3;* b) ovary, id.; c) sepal of staminate flower, id.; d) peduncle and stamen, id.; e) peduncle and fruit, id.; f) section of fruit and seed, id. 85. T. DEBILE Buck.: fruit, *Buckley,* Alabama. 86. T. ARKANSANUM Boivin: fruit, *Bush 2445.* 87. T. PUDICUM Standley & Boivin: portion of stem with stipule and base of petiole, *Leavenworth & Hoogstraal 1013.* 88. T. MADRENSE Rose: fruit, *Rose 2232.* 89. T. PINNATUM Wats.: a) sepal of staminate flower, *Townsend & Barber 134;* b) sepal of pistillate flower, id.; c) fruit, *LeSueur 1059.*

FIGS. 92–114 (p. 467), all × 4; except 101e, × 1/5, and 110c and 113a, these × 3

FIG. 92. T. VENULOSUM Trel.: a) sepal of pistillate flower, *Roy,* Bellerive; b) ovary, id.; c) sepal of staminate flower, *Potter 380;* d) stamen, *Herriot 69,803;* e) fruit, *Scamman 2892.* 93. T. CONFINE Fern.: a) sepal of pistillate flower, *Potter 381;* b) sepal of staminate flower, *Victorin & Rolland 18,777;* c) ovary, id.; d) stamen, *Potter 382;* e) fruit, *Knowlton,* Grand Isle; f) section of fruit and seed, *Potter 383.* 96. T. STEELEANUM Boivin: a) sepal of pistillate flower, *Morris 1527;* b) sepal of staminate flower, *Steele,* Feeder Dam Island, July 10; c) stamen, *Steele,* Feeder Dam Island, May 10; d) fruit, *Long & Bartram 1292.* 97. T. CORIACEUM (Britt.) Small: fruit, *Curtiss,* Bedford Co. 99. T. OCCIDENTALE Gray, VAR. TYPICUM: fruit, *Hall,* 1871. 101. T. OCCIDENTALE Gray, VAR. PALOUENSE St. John: a) peduncle and fruit, *Raup & Abbe 3867;* b) peduncle and fruit, *Kirkwood 1876;* c) section of fruit and seed, id.; d) stamen, *Cusick 1515;* e) inflorescence, *Kirkwood 1876.* 102. T. FENDLERI Engelm.: a) peduncle and stamen, *Metcalfe 248;* b) section of fruit and seed, *Munz 8696;* c) fruit, id.; d) fruit, *Parish 1483;* e) fruit, *Heller 11,669.* 103. T. FENDLERI Engelm., VAR. WRIGHTII (Gray) Trel.: fruit, *Wright 834.* 104. T. FENDLERI Engelm., VAR. SINUOSUM Boivin: fruit, *Nelson 4749.* 105. T. FENDLERI Engelm., VAR. QUADRINERVATUM Boivin: fruit, *Wiggins & Demaree 4941.* 106. T. POLYCARPUM (Torr.) Wats.: a) sepal of pistillate flower, *Kellogg & Harford 3;* b) stamen, *Hansen 563;* c) fruit, *Smith 306.* 107. T. REVOLUTUM DC.: a) stamen, *Pease 3782;* b) sepal of staminate flower, id.; c) sepal of pistillate flower, *Rich,* Stoneham; d) ovary, id.; e) seed, *Fernald & Weatherby 16,807;* f) fruit, id. 108. T. MACROSTYLUM Small & Heller: a) sepal of pistillate flower, *Small & Heller,* Hickory; b) sepal of staminate flower, *Small & Heller 428;* c) stamen, *Small & Heller,* Hickory; d) fruit, *Small & Heller 1015.* 109. T. SUBROTUNDUM Boivin: a) ovary, *Godfrey & Tryon 121;* b) stamen, id.; c) peduncle and fruit, id. 110. T. POLYGAMUM Muhl.: a) stamen, *Burnham,* Tripoli; b) fruit, *Robinson,* Rangeley Lakes; c) head of mature carpels, *Muenscher & Clausen 4649.* 111. T. POLYGAMUM Muhl., VAR. HEBECARPUM Fern.: a) stamen, *Fernald & Williams,* Rivière du Loup; b) fruit, *Fernald & Long, 28,274.* 112. T. POLYGAMUM Muhl., VAR. INTERMEDIUM Boivin: stamen, *Woodward,* Franklin. 113. T. DASYCARPUM Fisch. & Lall.: a) head of mature carpels, *Lunell.* Lake Ibsen; b) stamen, *Moseley,* Oxford. 114. T. DASYCARPUM Fisch. & Lall., VAR. HYPOGLAUCUM (Rydb.) Boivin: a) ventral side of an immature fruit showing the fully expanded stigma and the small hole in the wall of the ovary near the base of the style, *Stevens 920;* b) stamen, *Palmer 3969.*

INDEX

New scientific names are printed in full-face type

Anemone, 347
Anemonella, 347
Aquilegia, 347
Artemisia, 462

Clavata, 360
Compressicarpidium, 360
Coptis, 347

Hepatica americana, 405
Homothalictrum, 350

Leucocoma, 346, 347, 469; albens, 480; canadensis, 375; dasycarpa, 480; dioica, 435; Lunellii, 439; thyrsoidea, 439; thyrsoidea sylvana, 439; vegeta, 480

Physocarpa, 346
Physocarpon, 346
Physocarpum, 346, 360; clavatum, 363; podocarpum, 421
Physocarpus, 346

Ruprechtia, 346, 375

Sumnera, 346, 347, 360; clavata, 363

Thalictraceae, 347
Thalictrum subg. **Lecoyerium,** 341, 348, **391;** subg. Physocarpidium, 360; subg. Thalictrum, 348, 349; subg. Tripetrium, 375; subg. or sect. Leucocoma, 469; § Cinncineria, 341; § Heterogamia, 341; § Leucocoma, 342; § Omalophysa, 349; § Physocarpum, 342; sect. Camptogastrum, 348, 399, e. Dioica, 435, f. Flexuosa, 350, b. Macrocarpa, 391, c. Platycarpa, 485, d. Podocarpa, 411; sect. Camptonotum, 485, c. Petaloidea, 485; sect. **Cincinneria,** 348, **391,** 395, 397; sect. **Erythrandra,** 348, **360;** sect. Euthalictrum, 349; sect. **Genuina,** 348, 349, **360;** sect. **Heterogamia,** 349, **432;** sect. Homothalictrum, 348, 350; sect. **Leptostigma,** 348, **360;** sect. **Leucocoma,** 349, **469;** sect. Omalophysa, 348, 368; sect. **Pelteria,** 348, **423;** sect. Physocarpum, 348, 360, 361; sect. Thalictrum, 349, l. Heterogama, 432; sect. Tripetrium, 348, 375; subsect. **Clavocarpa,** 349, **443;** subsect. **Compressa,** 349, **453;** subsect. **Debilia,** 349, **432,** 484; subsect. **Dioica,** 349, **435;** subsect. **Eupeltata,** 348, **426,** 427; subsect. Genuina, 360; subsect. **Gibbosa,** 348, **411;** subsect. **Incurvata,** 349, **439,** 454; subsect. **Laminaria,** 349, 454, **457;** subsect. **Simplicia,** 348, **404;** subsect. **Sinuosa,** 349, **433;** subsect. **Subpeltata,** 348, **423;** subsect. **Venturiana,** 348, **422;** acaule, 358; acteaefolium, 367; **acutifolium,** 362, **364,** 485; **aduncum,** 392, **393,** 486; albens, 480; alpinum, 337, 341, 350, 352, 353, 375, 376, var. elatum, 358, 359, var. gaspense, 353, 354, var. **hebetum, 356,** var. microphyllum, 358, var. microspermum, 353, 355, var. nesioticum, 353, 354, var. pallidum, 353, 355, var. pudicum 353, 355, var. stipitatum, 358, 485, var. **typicum, 353,** 485; altissimum, 475, 479; amabile, 471, 473; ametrum, 463, 464; amphibolum, 482; angustifolium, 350; aquilegifolium, 347, 375–377, 486, var. typicum, f. **Cornuti, 375;** aristatum, 471; **arkansanum,** 432, **433,** 487; **Arsenii,** 426, **430,** 487; baicalense, 361, 362, 485, var. **megalostigma,** 361, **363,** 485; bernardinum, 463; Bissellii, 475, 476; bracteifilum, 358; caesium, 463, 464; calabricum, 360; campestre, 439; campylopodum, 463, 464; canadense, 337, 375–377, 469, var. hebecarpum, 478; carolinianum, 484, var. subpubescens, 484; caulophylloides, 444, 445; **Chapinii,** 392, **395,** 486; cheilanthoides, 356, 357; **Chiaonis,** 362, **368,** 485; chymocarpum, 393, 394; **cincinnatum,** 391, 392, **398,** 486; clavatum, 342, 361–365, 369, 370, 372, 485, var. acutifolium, 364; columbianum, 442, 443; confertum, 375, 377; confine, 341, 375, 376, 439–441, 454, 487, var. **columbianum,** 439, **442,** 485, var. **Greeneanum,** 439, **442;** contortum, 369; **Con-**

zattii, 402, **417,** 486; cordifolium, 421; coreanum, 361, 368; coreospermum, 463, 464; coriaceum, 442-444, 487; Cornuti, 337, 375–377, var. *β.*, 480, var. brevifolium, 471, 473, 474, var. macrostylum, 471, 473, var. monostyla, 485, var. stipitum, 475, 477; corynellum, 376, 475, 478; crenatum, 359; cuernavacanum, 426, 431, 487, var. **supraglabrescens,** 426, **432;** Dalzelli, 360; dasycarpum, 375, 376, 408, 470, 480, 484, 487, f. hypoglaucum, 482, var. **hypoglaucum,** 470, 471, **482,** 483, 487; **Deamii,** 401, **408,** 486; debile, 341, 432, 433, 462, 487, var. texanum, 432; **decipiens,** 401, 403, **405,** 486; **declinatum,** 362, **364,** 485; densiflorum, 359, 360; dioicum, 337, 340, 375, 376, 391, 432, 435, 436, 442, 465, 466, 476, var. adiantinum, 435, 438, var. coriaceum, 444, var. genuinum, 435, var. huronense, 435, var. Langfordii, 435, var. oxycarpum, 454, var. *α.* purpurascens, 484, *β*? stipitatum, 444, 454, var. stipitatum, 377, 444, 454; dioicum × polygamum, 442; dioicum × purpurascens, 440–442, 445; divergens, 475, 478; domingense, 483; duriusculum, 356, 357; elegantulum, 356, 357; Esquirolii, 350, 359; Falconeri, 360; Fendleri, 340, 454, 457, 459, 461, 462, 465, 466, 484, 485, 487, var. hesperium, 458, var. platycarpum, 457–461, var. ? polycarpum, 459, 463–466, 468, 469, var. polycarpum, 468, var. **quadrinervatum,** 457, **463,** 487, var. **sinuosum,** 457, **462,** 487, var. Wrightii, 457, 461, 466, 487; filamentosum, 362, 363, 485; filipes, 363; fissum, 442, 443, 459; flavum, 350, *β.*, speciosum, 359; foetidum, 347, 350, 360, 375; Fortunei, 360; Galeottii, 400, 404, 486; galioides, 350; gibbosum, 399, 402, 403, 410, 411, 418, 419, 486; glaucodium, 456, 475, 476; glaucum, 338, 359, 360; grandiflorum, 408, 418, 419; grandifolium, 341, 401, 408, 418, 419, 486; graveolens, 471; guatemalense, 423–426, 486; **Gueguenii,** 362, **366,** 485; Hayatanum, 368; hepaticum, 475; Hernandezii, 401, 403, 405, 410, 416, 486; hesperium, 457; heterophyllum, 455, 456; **Hintonii,** 401, **405,** 486; hirsutum, 475; hondurense, 424, 426; **Hultenii,** 340, **352,** 485; hypoglaucum, 342, 482; ichangense, 361, 368, 485; **impexum,** 391, 392, **395,** 486; integrilobum, 362, 368; **innitens,** 391, 392, **394,** 395, 397, 486; **inuncans,** 339, 400, **404,** 422, 486; isopyroides, 350; jalapense, 414; jaliscanum, 426, 431, 487; javanicum, 360; Johnstonii, 348, 401, 412, 486; kemense, 350, 352; labradoricum, 478; **laeteviride,** 402, **415,** 486; laevigatum, 338, 435, 436; lanatum, 402, 412, 413, 415, 486; Lankesteri, 423, 486; lasiostylum, 403, 415, 416, 486; latiusculum, 463; leiocarpum, 463; leiophyllum, 356; lentiginosum, 463; leucostemon, 360; leucostylum, 475; leucocrinum, 478, 479; longepedunculatum, 393, 394; longistylum, 403, 419; Lunellii, 439, 440; **Macbrideanum,** 401, **407,** 486; macrocarpum, 392, 393, 399, 486; macrostigma, 482; macrostylum, 470, 473, 474, 487; madrense, 341, 433, 434, 487; magarum, 463, 464; majus, 352, 399; Mannii, 391, 393, 394, 399; marginatum, 358; megacarpum, 484; mendocinum, 463; microgynum, 362, 365, 485; microphyllum, 358; minus, 350, 351, var. elatum, 358, var. kemense, 352; mirabile, 362, 365, 366, 485; monoense, 356, 357; Mortoni, 456, 475, 477; Moseleyi, 480, 481; multiflorum, 464, 465; **Nelsonii,** 403, 410, **421,** 486; **nigromontanum, 453;** nippono-alpinum, 358; Nortoni, 480, 481; nudicaule, 363, 364; obliquum, 418, 419; occidentale, 453, 454, var. columbianum, 442, var. **Macounii,** 453, **454,** var. megacarpum, 485, var. palouense, 341, 453, 455, 456, 485, 487, var. **typicum,** 453, **454,** 485, 487; omissum, 458; pachuense, 400, 411, 486; panamense, 402, 407, 486; papillosum, 414; papyraceum, 463, 464; **parvifructum,** 400, 401, 403, **413,** 486; pauciflorum, 435, 438; peltatum, 338, 423, 426, 427, 430, 486, var. *β.* hirsutum, 424, 425; peninsulare, 402, 418, 486; **Pennellii,** 402, **413,** 486; perelegans, 475, 478, 479; perpensum, 475, 477; petaloideum, 360; philippinense, 361, 363, 485; pinnatum, 341, 433, 434, 487, var. **subternatum,**

433, **435**; platycarpum, 457; podocarpum, 401, 402, 421, 486; podolicum, 360; polycarpum, 342, 454, 457, 463–466, 468, 469, 487, var. caesium, 463, var. hesperium, 458; polygamum, 338, 375–377, 408, 442, 469–472; 475, 477, 478, 484, 487, var. hebecarpum, 341, 470, 471, 478, 487, var. **intermedium,** 470, 471, **479**, 480, 487, var. macrostylum, 473, var. pubescens, 484; praealtum, 475; Pringlei, 426–428, 486, var. reticulatum, 426, 428; propinquum, 455, 456; Przewalskii, 369; puberulum, 410; pubescens, 473, 475, 477, 478, 484; pubigerum, 403, 416, 417, 486; **pudicum,** 433, **434,** 487; pulchellum, 435; punduanum, 350; purpurascens, 337, 440, 442, 473, 478, 484, 485, var. ceriferum, 471, 472, var. dasycarpum, 480, *β*. monoicum, 440, var. rugosum, 359; purpureum, 485; rainierense, 455, 456; **refractum,** 401, **417,** 486; revolutum, 375, 376, 408, 469–471, 473, 474, 484, 487, f. glabrum, 471, 472; var. *β*. subglabrum, 471; rhynchocarpum, 339, 392–394, 396, 397, 399, 486; Richardsonii, 370, 372; Rochebrunianum, 360; **Roseanum,** 426, 427, **430,** 487; rotundifolium, 360; rufum, 360; rugosum, 338, 350, 359, 360, *β*. umbelliferum, 359; rutidocarpum, 403, 420, 486; sachalinense, 360; Sandbergii, 480, 481; saniculaeforme, 360; scopulorum, 356; **sessilifolium,** 403, **417,** 486; setulosum, 475; simplex, 350; sparsiflorum, 340, 341, 369, 372, var. **nevadense, 373,** 486, var. **Richardsonii, 369,** 486, var. **saximontanum, 372,** 486, var. **typicum, 369,** 485; speciosum, 359, 360; squarrosum, 350; Standleyi, 339, 400, 411, 486; **Steeleanum, 443,** 487; **Steinbachii,** 391, 392, **397,** 399, 486, Steyermarkii, 392, 397, 486; stipitatum, 418, 419, 458; Stolzii, 392, 396, 397; strigillosum, 403, 410, 414, 415, 486; subpubescens, 402, 416, 486; **subrotundum,** 470, **474,** 487; suspensum, 356, 357; tenerum, 365; terrae-novae, 478; texanum, 341, 432, 487; thibeticum, 360; thyrsoideum, 439, 440; thyrsoideum sylvanum, 439, 440; tomentellum, 416; **Torresii,** 423, **424,** 486; tortuosum, 456, 475, 476; **Treleasii,** 426, **427,** 486; tuberiferum, 362, 367, 485; tuberosum, 360; **unguiculatum,** 362, **365,** 485; utahense, 372; vegetum, 480, 481; **Venturii,** 400, 404, **422,** 486; venulosum, 341, 439, 440, 442, 454, 460, 487; vesiculosum, 402, 420, 486, var. peninsulare, 418; virgatum, 360; virginicum, 480; viride, 479, 480; **viridulum,** 401, **406,** 486; Watanabei, 362, 367, 368, 485; Wightianum, 480; Wrightii, 461, 462, 484; zibellinum, 478, 479

Trautvetteria, 347

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RUELLIA IN THE EASTERN UNITED STATES

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DATES OF ISSUE

Pages 1–38 and Plates 839–850 . . . . . 11 January, 1945
Pages 47–63 and Plates 851–860 . . . . . 3 February, 1945
Pages 69–90 and Plates 861–875 . . . . . 19 March, 1945

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Pages 47–63 and Plates 851–860 . . . . . 3 February, 1945
Pages 69–90 and Plates 861–875 . . . . . 19 March, 1945

OONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLIII

RUELLIA IN THE EASTERN UNITED STATES

M. L. Fernald

(Plates 839–875)[1]

Always a difficult genus to understand, *Ruellia*, as it occurs in the eastern United States, is quite as baffling as elsewhere. Field-experience for several seasons in eastern Virginia has demonstrated to Mr. Bayard Long and me that too often plants growing side-by-side will differ very strikingly in the degree of pubescence or its length on stem or calyx and that, to some extent, the specimens from a single small colony have to be arbitrarily sorted in order that those of a single number may be tolerably uniform. The accumulated collections have been allowed to wait, with the hope that some ambitious student would care to hunt for stable characters. Finally, however, the familiar "let Fernald do it" has prevailed and I have found it necessary to seek fundamental characters in the plants of the "Manual range". In doing so it soon became evident that, since names originally given to plants of Georgia, Carolina, Virginia, Kentucky or Arkansas were being currently used for species growing only far from the type-localities, it would be necessary to consider all species occurring from the Atlantic coast to Nebraska, Kansas and eastern Texas. Happily for me the polymorphic Mexican and Texan series centering about *R.*

[1]The cost of reproducing the plates defrayed through a gift from Mr. Bayard Long.

nudiflora does not extend into the area specially covered, and the relatively simple *R. Drummondiana* and *R. Parryi* are likewise excluded from the present study. I have been concerned only with the species which are definitely eastern or which extend eastward into the "Manual range".

In studying these relatively few species it has become evident that much recent publication upon them has rather glibly passed by the need even to look up the original descriptions of the earlier recognized species. Thus, although *R. humilis* Nutt. was described from "rocks in the upland forests and prairies" of Arkansas, a plant with oblong-ovate and sessile leaves, the name has been transferred by Small and others to a species with rosulate and chiefly spatulate leaves occurring, to quote Small, in "Sandy soil, Coastal Plain, Fla. to Miss. and Ga."; and the latter author says "Stem 1–3 cm. tall" but correctly identifies as *R. humilis*, in his sense, specimens up to ten times that height! Again, *R. hybrida* Pursh came from Savannah, Georgia, but Small restricts it to "Pinelands, Fla." As striking a case as any is *R. parviflora* (Nees) Britton, given by Small the range "Sandy soil, Coastal Plain and adj. provinces, Fla. to Tex., Ind. and N. J."; the case striking because *Dipteracanthus ciliosus*, γ. *parviflorus* Nees, basis of Britton's binomial, came from far away from the Coastal Plain, "Ad Ky. fluvium, Julio (Short! in herb. Hook.)". Incidentally, Nees described it with petioles 3–6 inches long—"corollâ vix pollicari, foliis paulo longiori petiolo (3–6-pollicari)." Such a description can hardly apply to a plant with petioles rarely 1.5 cm. long! Nevertheless the misbegotten name, *R. parviflora* (Nees) Britton, promptly came into vogue for almost anything, with either petioled or sessile leaves and no matter where it grew, until Blake revived *R. caroliniensis* (Walt.) Steud., which was based in a roundabout way upon Walter's clear description of a characteristic Carolina plant. When *R. caroliniensis* came to the front it replaced *R. parviflora* as a blanket-name for anything, just as, still earlier, the name *R. strepens* L. had covered almost every species in the United States.

The greatest complexity is in the two series of variations which together make up the northernmost or, at least, the most northern-ranging species, *R. humilis* and *R. caroliniensis*, for a number

of strictly southern species are relatively stable. The latter series of plants, relatively comforting to work with, includes *R. pedunculata* Torr., a clear-cut species radiating from the Ozarkian region southward into Louisiana and eastern Texas; two habitally similar but morphologically distinct new species, one of pine barrens of the Coastal Plain from South Carolina (possibly Virginia) to Louisiana, the other centering on the Blue Ridge and Alleghenies; another newly described species concentrated in southern Florida; *R. ciliosa* Pursh (as I interpret him), the characteristic rosulate-leaved plant of central Florida, north to South Carolina and west to Louisiana, the species treated erroneously by Small as *R. humilis* Nutt.; the fleshy plant of subtropical Florida, *R. succulenta* Small; and the local and amazingly clear long-flowered and large-fruited *R. noctiflora* (Nees) Gray, occurring from eastern Georgia to northwestern Florida, thence to southern Louisiana. There is no trouble in separating these relatively stable species nor in promptly recognizing the continental *R. strepens*.

The great difficulty is to find stable characters within the two polymorphous species, *R. caroliniensis* and *R. humilis*. The latter, characterized by somewhat uniform sessile or essentially sessile leaves, many flowering nodes and a strong tendency to bushy branching, is found through much of the prairie region, but in some of its variations it extends eastward to the Blue Ridge and in one variety even to northwestern Florida. In some areas the corolla may be only 2 cm. long, in others up to 8 cm. Whether the corolla is short or long the leaf-outlines present two parallel trends, on the one hand elliptic-oblong to oblong-lanceolate and (the larger ones) only 1–2.5 cm. broad, on the other hand ovate, oval-oblong or elliptic and 2–4 cm. broad. Furthermore, the pubescence varies from a copious wide-spreading hirsuteness to glabrescence (the latter especially on the Cumberland Plateau). Search at long and baffling periods through eight months has failed to bring to light any stable characters. The series is certainly an unstable one. I have, as the best I can yet do, suggested its recognition as a number of more or less segregated geographic varieties with some minor forms.

Similarly with *R. caroliniensis*, trials of first one character,

then another, from June to February, have led to optimistic moments, these always followed by despair. At one time the reactions of the seeds in the diverse trends within the mass of material looked like a hopeful character. In *Ruellia* (at least in all of ours) the thin and discoid seeds are superficially very similar. When soaked for a few seconds in water they give an immediate reaction. They promptly send out from the margin a continuous film of mucilage and the flat surfaces become covered with minute processes. When watched for a minute or two they broaden the marginal band of mucilage and the minute processes prolong as flexuous mucilage-spiracles, these visibly shooting out (as seen by a microscope) and often suggesting slender flames. Eventually (after many minutes) the whole surface is plush-like and the marginal band breaks up (on drying) into innumerable slender spiracles; and finally the spiracles somewhat collapse, fall together as domes and eventually subside. During a full week of soaking and watching the behavior of seeds, with thousands of objects to study, I had great hopes that the different species and varieties would yield in the behavior of moistened seeds something diagnostic. When, however, the whole series was compared I was forced to give up; the possibility that, in spite of its history and development, taxonomy, through *Ruellia*, was entering the field of experimental physiology, was discouragingly abandoned. I have, then, as the best I can do, treated the polymorphous *Ruellia caroliniensis* as a series of geographic varieties, some with pretty definite areas of development, others overlapping, and within these varieties, minor local forms in which the abundance, scarcity or length of pubescence strikingly differ.

In this unusually protracted study, in view of the small number of species involved, I have had not only the accumulated material of the Gray Herbarium but that of several of the larger herbaria and of a number of smaller ones, to the officers or owners of which I extend my cordial thanks for the use of their material. Throughout the work, both in bibliographic details and in making the plates I have had the unlimited and most valuable aid of Dr. BERNICE G. SCHUBERT. Even if the keys and descriptions fail to convey my ideas of a still perplexing group her photographs will make quite clear the chief diagnostic characters.

In the citations, specimens which are in the Gray Herbarium are rarely designated as being there, then by G. The other herbaria cited are as follows:

E. Lucy Braun (Braun)
Duke University (Duke)
F. W. Hunnewell (F. W. H.)
Missouri Botanical Garden (Mo)
New York Botanical Garden (NY)
University of North Carolina (NC)
University of Pennsylvania (Pa)
Philadelphia Academy of Sciences (Phil)
Dr. P. O. Schallert (Schallert)
United States National Arboretum (USNA)
United States National Herbarium (US)
Virginia Polytechnic Institute (VPI)

As I understand these species they are as follows.

Key to Ruellia in the Eastern United States

a. Main axis terminating in a prolonged flowerless leafy tip, with flowers 1–few at leafy-bracted summits of branches or on peduncles from the median or lower axils, or the cymose inflorescence much branched....*b.*

b. Leaves chiefly elongate-linear; bracts of loose cyme linear or linear-lanceolate; garden-escape in the Gulf States. 1. *R. Brittoniana.*

b. Leaves lanceolate, oblong, elliptic or ovate; peduncles terminated by dilated bracts; indigenous....*c.*

c. Calyx-segments lanceolate to lance-linear, flat to the tip, 2–4 mm. broad; ovary and capsule glabrous; larger leaves with blades 7–18 cm. long and 3–9 cm. broad..2. *R. strepens.*

c. Calyx-segments narrowly linear, tapering to prolonged linear-acicular tips, the segments 0.5–1.2 mm. wide at base; larger leaf-blades 2–11 cm. long and 0.8–5 cm. broad....*d.*

d. Stem usually divergently branching, the branches simple or forking, or stem simple to but slightly branched; peduncles or glomerules from axils of main stem or branches; calyx-segments 0.5–1 mm. wide, tapering from base to very slender tips.
Calyx, ovary and capsule pilose with slender-tipped but short spreading pubescence; plant of Ozarkian and adjacent areas.....3. *R. pedunculata.*
Calyx closely covered with appressed and partially immersed slender cystoliths; ovary and capsule glabrous; plant of southeastern Coastal Plain 4. *R. pinetorum.*

d. Stem simple or with few ascending branches; peduncles 1-flowered, from 1 or 2(–4) nodes; calyx-segments linear, 0.7–1.2 mm. wide to near middle, tapering thence to apex, minutely canescent-pilose; capsule pilose-hirtellous; Appalachian and eastern Piedmont species.....5. *R. Purshiana.*

a. Main axis with sessile or very short-peduncled glomerules or flowers in the axils of the upper (sometimes median and lower) leaves, or the terminal pairs of leaves crowded and approximate to the upper fertile axils....*e.*

e. Calyx-segments flat, lanceolate, 2–4 mm. wide, shorter than to but slightly exceeding capsule; flowers chiefly or wholly cleistogamous, with small closed corollas; wide-ranging erect simple or but slightly erect-branching continental plant.....2a. *R. strepens*, forma *cleistantha.*

e. Calyx-segments narrowly linear, with prolonged and slender to almost bristleform tips mostly overtopping the capsules; flowers rarely cleistogamous (except in nos. 5a and 6), mostly showy and expanding....*f.*

f. Plant strongly dimorphic or heteromorphic; the vernal (sometimes later) stems erect and simple or slightly branched, with 1–3 showy flowers from axils of 1–3 pairs of upper leaves; later trailing or decumbent branches prolonged and bearing dense glomerules of mostly closed tubular cleistogamous flowers and abundant glabrous capsules; leaves elliptic, oblong, oblanceolate or narrowly obovate, 1.5–5.5 cm. long, definitely short-petioled, firm, with one or both faces often closely covered with slender cystoliths; expanded corolla 2.5–6 cm. long; calyx 1.5–2.5 cm. long; plant of Florida.....6. *R. heteromorpha.*

f. Plant not strongly or not at all dimorphic; flowers all or nearly all with expanded corollas or, if most or all flowers cleistogamous (in no. 5a), the plant erect and simple or nearly so and the capsules pilose-hirtellous....*g.*

g. Principal leaves spatulate-oblong or spatulate-obovate, with prolonged bases and rounded or blunt tips; stem very short and with the crowded basal leaves subrosulate, or stem elongate and erect, with the 2–5 pairs of spatulate leaves remote, these 0.3–3 cm. broad; veins of leaves and usually the uppermost internodes white-villous; species of southern Costal Plain.....7. *R. ciliosa.*

g. Principal leaves ovate, lanceolate, elliptic or oblong, not appearing rosulate (if slightly subspatulate and round-tipped in no. 8, then with only minutely pilose to glabrescent fleshy stems)....*h.*

h. Stem fleshy, often hollow, glabrescent, erect, simple or with strongly ascending branches; leaves fleshy, purple-tinged, oblanceolate, narrowly obovate or oblong, essentially glabrous; calyx shorter than to one third longer than the glabrous capsule; plant of Everglades region of southern Florida....8. *R. succulenta.*

h. Stem not fleshy, solid, firm, pubescent to rarely glabrous; leaves membranaceous to firm, not fleshy, rarely purplish, linear-lanceolate to broadly lanceolate, oblong, elliptic or ovate, pubescent to glabrate or glabrous; calyx exceeding capsule....*i.*

i. Leaves sessile or barely petioled but often with narrowed bases, nearly uniform or the upper but slightly reduced, erect or ascending.

Simple or with erect branches (divergently branched only after injury); primary axis with 3–10 remote pairs of narrowly lanceolate to lance- or elliptic-oblong submembrana-

ceous puberulent or minutely hirtellous leaves tapering to apex; flowers 1–few from 1–4 upper nodes; calyx 2.5–4.5 cm. long, cinereous-puberulent or minutely hispidulous; corolla 6–11 cm. long, its slender tube 4.5–8 cm. long; capsule cinereous-puberulent, 2.25–3.5 cm. long; species of southern Coastal Plain . . . . 9. *R. noctiflora.*

Branching, rarely simple, the elongate arched-ascending to widely divergent branches often reclining at base, decumbent or with bushy habit; leaves narrowly oblong-lanceolate to broadly oval or ovate, coriaceous, with blunt or rounded tips, often hirsute to coarsely villous, 4–12 pairs on well developed primary axis equaling or longer than internodes, 4–10 nodes floriferous; calyx 1.5–2.5 cm. long, usually hirsute- to villous-ciliate; corolla 2–8 cm. long, its tube 0.7–5 cm. long; capsule glabrous, 1.2–1.5 cm. long; plant of Great Plains, eastward to Blue Ridge and, rarely, northwestern Florida. . . . . 10. *R. humilis.*

i. Leaves, or at least the principal ones, tapering to definite petioles (up to 2 cm. long), spreading to ascending; primary axis with 1–4 flowering nodes or, if more, with leaves often undulate-dentate.

Upper internodes greatly abbreviated, villous, hirsute, puberulent or glabrescent; upper pairs of leaves approximate or crowded; corolla usually showy and expanding, the flowers only exceptionally cleistogamous; calyx-segments linear-setaceous, attenuate from near the base; capsules glabrous (or, if pilose, the plant with copiously villous upper internodes, leaves and calyces) . . . . . 11. *R. caroliniensis.*

Upper internodes elongate, minutely pilose-puberulent; upper pairs of leaves distant; corolla usually clavate, inconspicuous, unexpanding, the flowers cleistogamous; calyx-segments linear up to the middle, tapering above; capsules pilose-strigose
5a. *R. Purshiana,* forma *claustroflora.*

1. RUELLIA BRITTONIANA Leonard, emended and validated.[1] Stems usually several, subligneous, 3–10 dm. high, subterete, nearly or quite glabrous, soon branching, subcorymbosely

[1] Validated by the following Latin diagnosis:

RUELLIA **Brittoniana** Leonard, caulibus subligneis adscendentibus 3–10 dm. altis, deinde ramosis supra subcorymbosis; foliis plerumque lineari-lanceolatis utrinque valde attenuatis petiolatis, subtus lineolatis supra glabris, majoribus 0.8–2.8 dm. longis 0.5–2 cm. latis integris vel obscure undulatis; inflorescentiis subcorymbiformibus foliosis pedunculis rigide adscendentibus quam foliis subtendentibus 1/3–1/2 breviori-bus; bracteis bracteolisque lineari- vel anguste lanceolato-subulatis; calycis segmentis subrigidis anguste lanceolatis attenuatis ad apicem obtusum glabris vel sparsissime hirtellis supra cystolithos gerentibus, segmentis maturis 5–10 mm. longis; corollis 2.5–4 cm. longis fauce infundibuliforme extus glabro vel sparse piloso supra 0.9–1.5 cm. lato, limbo (expanso) 2.5–5 cm. lato; capsulis lanceolato-fusiformibus glabris 2–2.7 cm. longis, retinaculis 14–24; seminibus suborbicularibus 2–2.5 mm. diametro.

branched at flowering summit: lowest leaves linear-oblong to -spatulate; principal and rameal leaves narrowly linear-lanceolate or linear, long-attenuate to callous apex and to ascending petiole, pale green, glabrous above, often lineolate beneath, the larger (primary) ones 0.8–2.8 dm. long and 0.5–2 cm. broad, entire or obscurely undulate: inflorescence corymbiform, leafy, often equaled or exceeded by upper leaves, the stiffly ascending peduncles one third to half as long as the subtending leaves and cymosely forking: bracts and bractlets linear- to narrowly lance-subulate: calyx-segments subrigid, narrowly lance-attenuate to obtuse tips, glabrous, glabrescent or barely hirtellous, usually covered with pale cystoliths; the mature segments becoming 5–10 mm. long: corolla blue-violet, 2.5–4 cm. long; cylindric tube 8–13 mm. long; the broadly infundibuliform throat glabrous to but sparsely pilose without, 1.2–2 cm. long, 0.9–1.5 cm. broad at summit; limb (laid open) 2.5–5 cm. broad, with broad rounded lobes; capsule lance-fusiform, glabrous, 2–2.7 cm. long; retinacula 14–24; seeds suborbicular, 2–2.5 mm. in diameter.—Journ. Wash. Acad. Sci. xxxi. 96, fig. 1 (1941) without diagnosis but accepted and here validated as to type, *Cryphiacanthus angustifolius* Nees in DC. Prodr. xi. 199 (1847) in part (the Galeotti specimen from Jalapa); not *R. angustifolia* Swartz, Prodr. Veg. Ind. Occ. 93 (1788). *R. spectabilis* Britton in Ann. N. Y. Acad. Sci. vii. 192 (1893), without diagnosis, only as the Mexican plant was included in his citation of the type, *Cryph. angustifolius* Nees, l. c. but not as to Paraguayan plant cited; not *R. spectabilis* Nicholson, Gard. Dict. iii. 334 (1886). *R. malacosperma* sensu Small, Man. Se. Fl. 1229 (1933), not Greenman in Proc. Am. Acad. xxxiv. 572 (1909).—Native of eastern Mexico; cultivated and spread to disturbed soils, roadsides, cultivated ground, borders of ditches, etc., from Texas to Florida. FLORIDA: open places, Arcadia, 1918, *Small*, no. 9010 (NY) as *R. malacosperma;* Glen St. Mary, June, 1923, *C. R. Stevens* (Mo); roadsides, Ft. Myers, Aug., 1921, *W. M. Buswell* (NY) as *R. malacosperma.* LOUISIANA: low sandy soil, Houma, Aug. 31, 1913, *E. C. Wurzlow* (Mo and US) as *R. spectabilis*, Oct. 10, 1913, *Wurzlow* (NY), identified by Small as *R. malacosperma*, by Leonard as *R. Tweediana* Griseb. TEXAS: escaped from gardens, San Antonio, Sept. 20, 1901, *Bush*, no. 864 (Mo); damp places near Polytechnic, Oct. 10, 1916, *A. R. Drumm* (US) as *R. spectabilis;* Houston, July 10, 1934, *Cory*, no. 11,330, as *R. Tweediana.* SAN LUIS POTOSI: wet ledges by river, Micos, July 31, 1891, *Pringle*, no. 5043, as *R. Tweediana;* gravelly and rocky sand near river, alt. 200 feet, near Axtla, June 27, 1942, *J. N. Weaver*, no. 658, as *R. Tweediana*, corrected to *R. Brittoniana.* VERA CRUZ: in the bed of the Colobozo near Tantoyuca, April, May, 1858, *Ervendberg*, no. 104, identified by Asa Gray as *Cryphiacanthus angustifolius*, by Leonard as *R.*

Tweediana; along streams, Tenera, Zacuapan, Dec., 1912, *Purpus*, no. 6162, identified by Leonard as *R. Tweediana;* Barranca de Panoya, Sept., 1919, *Purpus*, no. 8409, identified by Leonard as *R. Tweediana.* GUATEMALA: cultivated, vicinity of Quiriguá, Dept. Izabel, *Standley*, no. 24,307, as *R. malacosperma*, another number (72,225) cited by Leonard as *R. Brittoniana* in publishing that unclarified name. N. B. The Mexican material in the Gray Herbarium only here cited. PLATE 839.

So far as I can find the specific characters of *Ruellia Brittoniana* have never been clearly stated, except partially by Nees who, under the name *Cryphiacanthus angustifolius*, had two quite distinct but by him undifferentiated species, and partially by Small, who described and had before him *R. Brittoniana* but misidentified it as *R. malacosperma.* In fact, the entire history of the names and the recognition of specific lines in the two plants, inadequately treated by Nees in 1847 as a geographically bi-centric species, *Cryph. angustifolius*, is one of discreditably opportunist shiftings, without any evident attempt at clarification. The original treatment of the two confused species by Nees in DC. Prodr. xi. 199 (1847) was

> 5. C. ANGUSTIFOLIUS, caulescens, foliis lanceolato-linearibus acutis integerrimis sessilibus glabris, pedunculo subbifloro folio breviore, calycis laciniis subulatis scabris. ♃ Ad Xalapa (Galeotti! in h. Hook.), Entre Rios (Tweedie!). Corolla pollicaris. Capsula 9 lin. longa, lanceolata, 16–20-sperma. (v. in h. Hook.)

The first separation of the Mexican (Xalapa or Jalapa, *Galeotti*) plant and the Argentinian (*Tweedie*) elements was in 1879 when Grisebach, in his *Symbolae ad Floram argentinam*, in die Abhandlungen Königlichen Gesellschaft der Wissenschaften zu Göttingen, xxiv. 259 (1879), took out the Argentinian element, as *Ruellia Tweediana* Griseb.:

> 1597. R. Tweediana Gr.—Syn. Cryphiacanthus angustifolius Tweedianus Ns. Folia variant lineari-lanceolata et inferiora breviora lanceolate v. ovato-lanceolata.—E [i. e. Prov. Entrerios, as explained by Grisebach on his p. 4, Nees having originally cited "Entre Rios"].

In other words, Grisebach, concerned only with the flora of Argentina and not the Galeotti specimen from Xalapa (or Jalapa) in the state of Vera Cruz, Mexico, based his *Ruellia Tweediana* (without adequate description) on the Tweedie specimen cited by Nees. Since Grisebach did not use trinomials but regularly designated varieties as "var." (see the synonym of *R. geminiflora*

Kunth given by him on the same page as "R. geminiflora var. humilis Gr.") it may reasonably be inferred that his typonym of *R. Tweediana* "Syn. Cryphiacanthus angustifolius Tweedianus Ns." was intended to mean the Tweedie element of *C. angustifolius*, Grisebach thus leaving out the Galeotti plant, which, by the very sensible but commonly ridiculed "doctrine of residues" remained as true *C. angustifolius*. If it be argued otherwise the result is somewhat the same, for there was already a *Ruellia angustifolia* Swartz (1788), so that *R. Tweediana* is the first valid name under *Ruellia*. Hemsley, in his monumental Biologia Centrali-Americana (Botany), ii. 508 (1882), seems to have suspected that the Jalapa (Mexican) plant was not identical with the Argentinian element, for he entered

Ruellia tweediana, Griseb. Symb. ad Fl. Arg. p. 259?
Cryphiacanthus angustifolius, Nees in DC. Prodr. xi. p. 199, saltem pro parte.
SOUTH MEXICO, Jalapa (*Galeotti*). Hb. Kew.
The Argentine plant may be a different species.

But Hemsley did not note any specific differences. Neither have those who have rather easily and very carelessly rushed into print with substitute-names. Thus, when, in 1893, in an enumeration of plants of Paraguay, Britton substituted for *Cryphiacanthus angustifolius* Nees the name *Ruellia spectabilis*, he obviously intended the plant of temperate eastern South America, not the Mexican element, but Britton's item was so hastily prepared that it is evident that he did not stop to gain a clear understanding of specific lines, nor had he gone carefully into the literature. His treatment was as follows:

Ruellia spectabilis, Britton.
Cryphiacanthus angustifolius, Nees in D.C. Prod., xi, 199, not
Ruellia angus[*t*]*ifolia*, Sw.
Caballero (461). January.
This species has branching stems 10–12 cm. high, linear, sessile leaves, and flowers larger than in no. 323 [*Ruellia Morongii* Britt., new name for *Cryphiacanthus acaulis* Nees, not *R. acaulis* R. Br.], otherwise much the same. Occurs on the railway track.

Since *Cryphiacanthus angustifolius* (in its inclusive sense) consists of erect, caulescent plants up to 1 m. high, with remote pairs of linear-lanceolate to broadly lanceolate leaves and glabrescent to only minutely glandular-hirtellous calyx about half the length of the capsule or shorter, while *Cryphiacanthus*

acaulis Nees, basis of *Ruellia Morongii*, is, as described by Nees and partly by Britton and as shown by all specimens, acaulescent, "Habitus *Primulae*" (Nees), with the basal rosulate leaves oblong-ovate, -obovate or subspatulate, and the calyces copiously villous-hirsute and equaling to exceeding the capsule, Britton's characterization of the two as "much the same" indicates a rather offhand understanding of a few conspicuously different species. Dr. Britton also overlooked the fact that, in his well known Dictionary of Gardening, iii. 334 (1886), George Nicholson had published a *R. spectabilis* (Hook.) Nicholson, based on *Dipteracanthus spectabilis* Hook. Bot. Mag. t. 4494 (1850), an Andean plant of a different section, with flowers sessile in the axils of ovate leaves, etc. Furthermore, Britton evidently overlooked *R. Tweediana* Griseb. (1879), the name he should have taken up for the Paraguayan as well as Argentinian *Cryphiacanthus angustifolius*. Had he looked up Grisebach's Symbolae he would not, on the same page with his *R. spectabilis*, have published as new *R. Tweedyi* (Nees) T. Anderson in Herb. Kew., based on *Blechum Tweedyi* Nees, for, by the rules promulgated and followed by Britton, the substantive-genitive personal names (such as *Tweedyi*) and the adjectival forms (such as *Tweediana*) could not both be used. By the International Rules, vigorously fought by Britton, his combination *R. Tweedyi* (Nees) T. Anderson ex Britton is rescued. Whether the type of *R. Tweedyi* is a *Ruellia* is much more doubtful. The genus *Blechum* is so very different from *Ruellia* that it would be surprising if Nees, who monographed both genera, did not know it. Incidentally, but of real importance, the original *Blechum Tweedyi* came from Panama. It would be very surprising, to say the least, if the same species (even if not a *Blechum*, a genus apparently unknown in Paraguay) were found also in Paraguay.

The next step in the tortuous history of the much abused typonym, *Cryphiacanthus angustifolius* Nees, was when Leonard, noting that Britton had slipped in publishing a second *Ruellia spectabilis*, gave, in Journ. Wash. Acad. Sci. xxxi. 96, fig. 1 (1941), another name:

Ruellia brittoniana Leonard, nom. nov. Fig. 1

Cryphiacanthus angustifolius Nees in DC. Prodr. **11:** 199. 1847. Not *R. angustifolia* Sw., 1788.

Ruellia spectabilis Britton, Ann. New York Acad. **7:** 192. 1893; not Nichols, 1886.

A single cultivated plant, from Guatemala, was cited and a very characteristic figure of the Mexican plant, with long-attenuate upper leaves inclined to overtop the subcorymbiform inflorescence, was given as fig. 1. Leonard gave no statement of characters nor any indication as to whether he was accepting *Cryphiacanthus angustifolius* in the original inclusive sense of Nees or whether he restricted it to the Mexican element left to stand for it when Grisebach withdrew the Argentinian element as *Ruellia Tweediana*. It is unfortunate, if he intended *R. Brittoniana* (Britton having published only on the Paraguayan plant) to stand exclusively for the quite different North American species, that he did not give any word of clarification, for the North American species, at least in the Gray Herbarium and the Britton Herbarium, had been annotated by Leonard as *R. Tweediana*. Incidentally, had he looked up the first publication of *R. spectabilis* he would have found that its author was Nicholson, not "Nichols". Only by accepting the possible and perhaps probable interpretation that, by removing the Tweedie element from the mixed originals of Nees as *R. Tweediana,* Grisebach had, by the "doctrine of residues", left the Mexican element as true *Cryph. angustifolius*—only by this interpretation can we possibly save for the Mexican plant the inappropriate name *R. Brittoniana,* which may or may not have been intended for it. I am following this interpretation merely in order to avoid publishing still another name and thus further increasing the confusion. If the alternative reasoning were adopted the Mexican species (cultivated and naturalized eastward to Florida) would require a new and clearly applied name, since none of the authors, from Grisebach on, who have hastily proposed new names in this relatively simple pair of species, has recognized the elementary requirement of sound taxonomy, of accurately defining their species and explaining what they meant.

I have stated above what I consider the specific characters of *Ruellia Brittoniana* as here validated, and in PLATE 839 its diagnostic characters are shown. In PLATE 840 I have shown some of the differential characters of *R. Tweediana;* and in the following paragraph I indicate some of its other claims to recognition as an endemic species of temperate eastern South America, the name *R. Tweediana* thus being validated:

R. Tweediana Grisebach, caulibus glabris; foliis inferioribus lanceolatis vel lanceolato-ovatis, supernis lanceolatis subacutis vel obtusis juvenilibus ciliolatis, majoribus 5–12 cm. longis integris vel undulatis; inflorescentiis elongatis subthyrsoideis; calycibus glanduloso-hirtellis, segmentis lineari-subulatis attenuatis ad apicem acutum hirtum; corollis 3–4 cm. longis extus valde pilosis, fauce supra 5–10 mm. lato; capsulis lanceolato-fusiformibus 2–2.5 cm. longis glabris. Tab. 840.

Since *Ruellia Brittoniana* has been mistaken by Small and his followers for *R. malacosperma* Greenm. it should be noted that the latter species differs in the following characters: young internodes of stem and young leaves villous-hirsute, becoming glabrate; leaves oblong or elliptic-lanceolate, often undulate-dentate, the primary ones slender-petioled, strigillose-lineolate; calyx lineolate, with lance-attenuate sharp-pointed segments becoming 1.5–2 cm. long; corolla 3.5–5 cm. long, essentially glabrous without; capsule 2.5–3 cm. long; seeds orbicular, broadly obovate or elliptic, 2.8–3.3 mm. long. The plant called *R. malacosperma* by Small (as represented in the Britton Herbarium) is not that species; all that I have seen of it belongs to the frequently cultivated *R. Brittoniana.*

2. R. strepens L., as emended by L. in 1771. Stems 1–few from a knotty rhizome, 0.2–1.1 m. high, simple or with few ascending branches, obtusely 4-angled, minutely pilose (often in decussate lines), glabrate or glabrous (rarely, when deeply buried in silts after freshets, the stem becoming strongly ligneous and then freely branching): lowest leaves small, rounded or obovate; principal leaves membranaceous, ovate, rounded or tapering to short but definite petioles, more or less acuminate, entire or barely undulate, the larger ones 7–18 cm. long and 3–9 cm. broad, short-strigillose on one or both surfaces or glabrescent, minutely ciliolate when young: short to long ascending peduncles (0.2–10 cm. long) borne from axils of 1–3 pairs of median leaves (very rarely terminal), these bearing a pair of dilated leafy bracts and usually 1–3 showy expanded flowers: calyx-segments lanceolate to lance-linear, flat to tip, 2–4 mm. broad, 1–2.5 cm. long, villous-ciliate, more or less villous or pilose to glabrescent on the back: corolla pale blue-violet, broadly expanding, 3–6 cm. long; the slender tube about as long as the broadly funnelform throat, the broad lobes rounded: capsule (relatively infrequent as compared with the next form) 1–2 cm. long, glabrous, usually overtopped by calyx-segments.—Sp. Pl. 634 (1753) in part, as emend. by L. Mantiss. Alt. 422 (1771), he thus excluding the wholly different plants of Dillenius and others; Schkuhr, Handb. ii. t.

clxxii. (1791); Willd. Sp. iii. 363 (1800); Pursh, Fl. Am. Sept. ii. 420 (1814); LeConte in Ann. Lyc. N. Y. i. 140 (1824); and later authors generally. *Dipteracanthus strepens* (L.) Nees in Linnaea, xvi. 292 (1842) and in DC. Prodr. xi. 121 (1847), including var. *calycinus* Nees, l. c. (1847), var. *pedunculatus* Nees, l. c. 122 (1847) and var. *strictus* (Nees) Nees, l. c. (1847), in part. *D. strictus* Nees in Linnaea, xvi. 293 (1842). *R. biflora* Balbis ex Nees in DC. Prodr. xi. 122 (1847) in synonymy, nomen only. *R. foliosa* Schweinitz ex Nees l. c. in synonymy, nomen only. *R. oblongifolia* Kinn ex Nees, l. c. in synonymy, nomen only. *R. vincaeflora* DC. ex Nees, l. c. in synonymy, nomen only.—Low woods, bottomlands, wooded swamps, etc., chiefly in basic or calcareous soils, South Carolina to eastern Texas, northeast and north to north-central New Jersey, southern Pennsylvania, central Ohio, Indiana, Illinois, southern Iowa and eastern Kansas. Fl. mid-May–July (rarely –October). The following, from a very much larger series, are characteristic. NEW JERSEY: New Brunswick, "common" June, 1894, *F. H. Blodgett* (NY). PENNSYLVANIA: LANCASTER CO.: rich wooded hillside along Conestoga Creek, 1 mile south of Bausman, *Louise F. A. Tanger*, no. 3270 (Pa, Phil); banks of Conestoga, near Lancaster, 1838, *W. W. Wister* (Phil), June 17, 1859, Porter; near Columbia, *S. W. Knipe* (Phil); "on an excursion to Safe Harbor", June 18, 1859, *Joseph Crawford* (Phil). CUMBERLAND CO.: creek-bankside, Camp Hill Borough, *H. L. Plasterer*, as D. E. and Dorothy Wade, no. 1727 (Pa). FRANKLIN CO.: Mercersburg, June, 1844, *Porter* (Phil). DELAWARE: without statement of locality, *Nuttall* (Phil). MARYLAND: CECIL CO.: Bald Friar, July 4, 1907, *E. B. Bartram* (Phil). MONTGOMERY CO.: banks of Potomac, June 6, 1881, *J. D. Smith;* Great Falls, *C. S. Williamson;* High Island, June 6, 1881, *C. S. Sheldon* (US). DISTRICT OF COLUMBIA: Potomac Flats, Chain Bridge, June 13, 1897, *Kearney* (NY); Canal District, June 9, 1897, *Steele* (US). WEST VIRGINIA: JEFFERSON CO.: along Shenandoah River, near Charlestown, *R. F. Martin*, no. 200 (USNA). CABELL CO.: dry hillside, Huntington, *Gilbert*, no. 123 (Mo, Pa). WAYNE CO.: Buffalo Creek, *Plymale*, no. 445. VIRGINIA: ISLE OF WIGHT CO.: base of rich calcareous wooded slopes by Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), *Fernald & Long*, no. 13,463. PRINCE GEORGE CO.: swampy woods, bottomland of Powell's Creek, Garysville, *Fernald & Long*, nos. 8472 and 8854. CLARKE CO.: Castleman Ferry, June 13, 1937, *O. M. Freeman* (USNA). FREDERICK CO.: low woods, Cedar Creek, Meadow Mills, *Hunnewell*, no. 13,712. SHENANDOAH CO.: along stream, north of Short Mt., *Allard*, no. 5087. PAGE CO.: shady ravine, eastern foothills of Massanutten Mountain, *W. H. Camp*, no. 1386 (NY). ROANOKE CO.: Roanoke River, south of Roanoke, *Small & Heller*, no. 431 (Phil). MONT-

GOMERY CO.: limestone soil, edge of woodlands just north of Price's Station, *A. B. Massey*, no. 5065. SOUTH CAROLINA: BERKELEY CO.: Eutaw Springs, May, *H. W. Ravenel.* AIKEN CO.: Aiken, Sept. 17, 1885, *H. W. Ravenel.* GEORGIA: without stated locality: "of the Savannahs", *Le Conte* (Phil); "Mts. of Georgia", *Chapman* (US). WALKER CO.: dry ground, Chickamauga Park, May 25, 1911, *J. R. Churchill.* (Specimens from Polk County, Florida, Mrs. *J. M. Milligan* (US) were presumably of cultivated plants. Chapman includes "Florida" in his stated range, but his "*R. strepens*" was made up of several other species. There is no material from Florida in the Britton Herbarium, rich in specimens from that state.) OHIO: ATHENS CO.: Athens, *J. P. Drushel*, no. 6623 (Mo). LAWRENCE CO.: open woodlands, Coal Grove, *Biltmore Herb.*, no. 4500[b] (US). FRANKLIN CO.: Columbus, *Sullivant.* MONTGOMERY CO.: Dayton, July 7, 1879, *L. V. Morgan* (US). BUTLER CO.: moist woods, Oxford, June 30, 1910, *Overholts* (Mo). HAMILTON CO.: near Cincinnati, June 15, 1879, *C. G. Lloyd* (NY, US); open woods on hillsides, Anderson's Ferry, June 14, 1905, *E. L. Braun* (Braun). (Specimens with the label "Plants of Northern Ohio", and marked as from Lucas County, bear the memorandum "Obtained from Mr. Burger of Toledo; never found it in northern Ohio".) INDIANA: WELLS CO.: moist banks of Wabash River, June 21, 1905, *Deam* (US). MONTGOMERY CO.: Crawfordsville, June 23, 1892, *Rose* (US). MARION CO.: woods along White River, *Scott McCoy*, no. 1938 (US). PARKE CO.: Turkey Run, *W. H. Dunkan*, no. 114 (Duke). VIGO CO.: Terre Haute, June 1, 1889, *B. W. Evermann* (US). BARTHOLOMEW CO.: creek-bottom north of Elizabethtown, *Deam*, no. 34,266. JEFFERSON CO.: Hanover, 1874, *Coulter* (Phil). KENTUCKY: SCOTT CO.: along Elkhorn Creek, Stamping Ground, *J. W. Singer*, no. 219 (US). FRANKLIN CO.: open woods, Farmdale, June 16, 1879, *H. R. Bassler* (Pa). SPENCER CO.: near High Grove, *E. L. Braun*, no. 3259 (Braun). WARREN CO.: Bowling Green, June, 1892, *Sadie F. Price* (Mo.); bluff along Gasper River, southeast of Hadley, *Leslie Hubricht*, no. B2170 (Mo). UNION CO.: moist overflow-forest, near State Lake, *H. T. Shacklette*, no. 345. LYON CO.: Kuttawa, *Eggleston*, no. 4524 (NY). TENNESSEE: KNOX CO.: woods, Knoxville, *Ruth*, no. 591 (Mo) and 721 (US), *Pennell*, no. 11,301 (Phil). HAMILTON CO.: Chickamauga Park, May 27, 1911, *J. R. Churchill.* DAVIDSON CO.: bluffs below Nashville, *Biltmore Herb.*, no. 4500[c] (US); Nashville, *Eggleston*, no. 4444; limestone cliff of Cumberland River, Nashville, *Pennell*, no. 11,411 (Phil). HOUSTON CO.: limestone bank, Erin, *E. B. Harger*, no. 7866. LAKE CO.: dense shade of sandy woods, Reelfoot Lake, *J. R. Swallen*, no. 2159 (US). ALABAMA: JACKSON CO.: dry soil, Stevenson, *Biltmore Herb.*, no. 4500[a] (US); Sand Mountain, *Biltmore Herb.*, no. 4500[d]

(US). CLARKE CO.: dry copses and hillsides, Thomasville, April 27, 1888, *C. Mohr*, as *R. ciliosa*, var. *ambigua* (US). MISSISSIPPI: LEE CO.: Tupelo, 1914, *Henshaw* (USNA). OKTIBBEHA CO.: low woods north of Starkville, *C. A. & Una F. Weatherby*, no. 6309. ILLINOIS: KANKAKEE CO.: Kankakee, *C. C. Crampton*, no. 212 (US). PEORIA CO.: rich woods, Peoria, July, 1903, *F. E. McDonald*. HANCOCK CO.: Augusta, *S. B. Mead*. MACON CO.: 3 miles east of Decatur, *Clokey*, no. 2486. PIKE CO.: Mississippi levees, East Hannibal, June 3, 1913 (Mo). RICHLAND CO.: Parkersburg, June 9, 1902, *Robt. Ridgway* (US). MARION CO.: Salem, June, 1860, *M. S. Bebb* (Phil). ST. CLAIR CO.: woods, St. Clair Co., Sept. 20, 1878, *Eggert;* Cahokia, June 11, 1890, *A. S. Hitchcock* (Mo); East Carondelet, June 4, 1875, *Eggert* (Mo, US). JACKSON CO.: black rich soil, bottoms of Big Muddy and Crab Orchard Creeks, *John McCree, Jr.*, no. 775 (Mo.). IOWA: DECATUR CO.: woods, June 29, 1904, *J. P. Anderson* (Mo). MISSOURI: PIKE CO.: dry bluffs, near Eolia, *John Davis*, no. 7617 (Mo). LINCOLN CO.: rich soil, Winfield, June 7, 1916, *John Davis*, no. 1406 (Mo). MARION CO.: Scipio Bluffs, north of Hannibal, *John Davis*, no. 1491 (Mo). ST. LOUIS CO.: Creve Coeur Lake, June 12, 1914, *M. W. Lyon* (Mo); Meramec Highlands, June 13, 1909, *W. W. Ohlweiler* (Mo); Allenton, *G. W. Letterman*, many collections (Mo); rich woods, Allenton, May 29, 1918, *J. R. Churchill*. JEFFERSON CO.: DeSoto, June, 1887, *H. E. Hasse;* Ditmar, *J. H. Kellogg*, no. 2005 (Mo). FRANKLIN CO.: Pacific, *Greenman*, no. 3895 (Mo). SHELBY CO.: rich woods near Bethel, *Palmer & Steyermark*, no. 40,908 (Mo). BUTLER CO.: low woods along Mud Creek, northwest of Rombauer, *Steyermark*, no. 11,420 (Mo). BOONE CO.: Rock Bridge, June, 1926, *H. W. Rickett* (Duke). PHELPS CO.: Jerome, June 1, 1914, *J. H. Kellogg*, no. 494 (Mo). SALINE CO.: Sweet Springs, June 20, 1886, *Wm. Trelease* (Mo). GREENE CO.: Springfield, June 11, 1887, *J. W. Blankinship* (Mo). STONE CO.: rich hillside woods, Galena, *E. J. Palmer*, no. 5774 (Mo, US). DAVIESS CO.: dry banks, Pattonsburg, *Bush*, no. 13,587. JOHNSON CO.: rich woods and thickets, limestone hills, Columbus, *E. J. Palmer*, no. 36,697 (Mo). BARRY CO.: barrens, Shell Knob, *Bush*, no. 15,596 (Mo). JACKSON CO.: Independence, *Bush*, no. 39 (Pa). CASS CO.: bottoms, June 23, 1864, *G. C. Broadhead* (Mo). JASPER CO.: woods, Webb City, *Bush*, no. 528 (Mo), *E. J. Palmer*, no. 528 (Mo). ARKANSAS: CRITTENDON CO.: bottomland, Hulbert, *Demaree*, no. 11,372. PHILLIPS CO.: Crowleys Ridge, Helena, *Demaree*, no. 19,240 (NY, Mo). PULASKI CO.: Little Rock, *H. E. Hasse* (NY); swampy Arkansas bottoms, Little Rock, *Demaree*, no. 17,321 (Mo). KANSAS: LEAVENWORTH CO.: woody ravines, Fort Leavenworth, June, 1854, *F. V. Hayden* (Mo). WYANDOTTE CO.: low woods, May 30, 1897, *K. K. Mackenzie*

(NY). CHEROKEE CO.: woods along Shoal River, near Schimmerhorn Pk., no. 20,178, from *Kansas State College* (NY). RILEY CO.: low woods, *J. B. Norton*, no. 387; Manhattan, June, 1886, *Kellerman* (US). COWLEY CO.: 1895, *C. N. Gould* (NY), May, 1898, *Mark White* (Mo). OKLAHOMA: SEQUOYAH CO.: damp, shaded ground near mouth of Illinois River, *Goodman & Barkley*, no. 2131. LE FLORE CO.: low woods, Poteau, *E. J. Palmer*, no. 8275 (Mo). CREEK CO.: Sapulpa, June 2, 1924, *C. B. Williams*. KAY CO.: woods, Tonkawa, *G. W. Stevens*, no. 1869. OKLAHOMA CO.: wooded creek-bottom north of Edmond, *Waterfall*, no. 1975. POTTOWATTOMIE CO.: in small valley, St. Louis, *Mortimer Faulkner*, no. 106 (Mo). MURRAY CO.: Davis, *W. H. Ennig*, no. 683 (Mo). TEXAS: without stated locality, *Drummond*, no. 259 (cited by Nees under his *Dipteracanthus strepens*, vars. *strictus* and *pedunculatus* and under several other species and varieties!); Coombs Branch, *Reverchon* (Mo). DALLAS CO.: woods, Dallas, May 6, 1874, *Reverchon* (Mo); moist woodlands, Dallas, *Biltmore Herb.* no. 4500[h] (US); vicinity of Dallas, *Mary R. Stephenson*, nos. 91 and 94 (US). TARRANT CO.: rich woods near Trinity River, Lake Worth, *Ruth*, no. 318 (Pa, Phil, US). FORT BEND CO.: Richmond, *W. L. Bray*, no. 118 (US). PLATE 841; MAP 1.

2a. Forma CLEISTANTHA (Gray) S. McCoy. Flowers and abundant fruits borne in sessile or subsessile glomerules from the upper and often from most (1–8) of the axils, the stem only occasionally branching: calyx-segments often more pubescent and much shorter than to but little longer than capsule: corolla relatively small, usually reduced to a slender closed tube 0.7–2 cm. long, pale to creamy, but sometimes partially expanding or even large and terminal: capsules abundant, usually plumper and shorter than in typical form of species; retinacula mostly 6 or 8: seeds suborbicular to elliptical, 3–4 mm. long.—Am. Bot. xliii. 24 (1937). *Dipteracanthus micranthus* Engelm. & Gray in Bost. Journ. Nat. Hist. v. (Pl. Lindheimerianae), 49 (1845). *Hygrophila illinoiensis* Wood in Bull. Torr. Bot. Cl. v. 41 (1874). Var. *cleistantha* Gray, Syn. Fl. N. Am. ii[1]. 327 (1878). *R. strepens micrantha* (Engelm. & Gray) Britton in Mem. Torr. Bot. Cl. v. 300 (1894).—Same range as the typical form of the species. Fl. June–October. The following from a very large representation before me are characteristic (omitting stations enumerated under the preceding). PENNSYLVANIA: LANCASTER CO.: wooded hillside along Conestoga Creek, south of Wabank, *L. F. A. Tanger*, no. 4603 (Pa, Phil); edge of woods along Conestoga Creek, south of Millersville, *Tanger & Groff*, no. 4872. MARYLAND: CECIL CO.: Conowingo, Aug. 19, 1906, *J. J. Carter* (NY, Phil). KENT CO.: Tolchester Beach, September 4, 1906, *C. S. Williamson* (Phil). WEST VIRGINIA: OHIO CO.: thickets near Wheeling Creek, east of Wheeling, July 22, 1909, *Mac Elwee* (Phil). VIRGINIA: CHARLES

CITY CO.: alluvial woods along James River, Harrison Point, *Fernald & Long*, no. 9150. PRINCE GEORGE CO.: wooded swamp by James River, south of Indian Point, *Fernald & Long*, no. 11,153. LOUDON CO.: Short Hill, Aug. 9, 1936, *O. M. Freeman* (USNA). WARREN CO.: bottomlands by Shenandoah River, *Hunnewell*, no. 17,872 (stems, deeply covered by freshet-silts, subligneous, with strong branches and shortened and firm leaves). ROCKBRIDGE CO.: Natural Bridge, Sept. 14, 1907, *E. B. Bartram* (Phil). OHIO: FRANKLIN CO.: Gahanna, Oct. 19, 1903, *O. E. Jennings*. WARREN CO.: moist rich soil along Little Miami River, South Lebanon, *E. B. Harger*, no. 8010. INDIANA: GIBSON CO.: low woods bordering Eggwood Pond, *Deam*, no. 9958 (NY). KENTUCKY: NELSON CO.: wooded ravine east of Chapin, *Wherry & Pennell*, no. 13,673 (Phil). EDMONSON CO.: wooded alluvial flat of Green River, Mammoth Cave, *E. L. Braun*, no. 3611 (Braun). DAVIESS CO.: swamp in Ohio River bottom, Maceo, *Wherry & Pennell*, no. 13,585 (Phil). TENNESSEE: SHELBY CO.: Memphis, Oct. 20, 1850, *Fendler*. ALABAMA: WITHOUT STATED LOCALITY: *Buckley* (paratype of *Dipteracanthus micranthus* Engelm. & Gray). LEE CO.: "N. W. of Lee Co.", June 24, 1897, *F. S. Earle* (NY). ILLINOIS: CHAMPAIGN CO.: Urbana, Oct. 4, 1880, *A. B. Seymour* (Duke). WABASH CO.: Mt. Carmel, 1874, *J. Schneck* (isotypes of *Hygrophila illinoiensis* Wood). HARDIN CO.: low woods, Elizabethtown, *E. J. Palmer*, no. 17,023 (Mo). IOWA: HENRY CO.: Mt. Pleasant, *J. H. Mills*, no. 1854 (Mo). MISSOURI: ST. CHARLES CO.: Watson, *Wm. Trelease*, no. 453 (Mo). ST. LOUIS CO.: St. Louis, Sept. 1845, *Engelmann* (paratypes of *Dipteracanthus micranthus*). IRON CO.: moist shady ground, Iron Mountain, Sept. 1897, *Colton Russell* (Mo). MISSISSIPPI CO.: rich swampy woods, Three States Timber Tract, southwest of Wolf Island, *Steyermark*, no. 8761 (Mo). OZARK CO.: thickets along creek, near Bakersfield, *E. J. Palmer*, no. 32,872 (Mo). TANEY CO.: woods, Swan, *Bush*, no. 697 (Mo). SULLIVAN CO.: Pawpaw Junction, Sept. 15, 1893, *Bush* (Mo). HICKORY CO.: low woods along Pomme de Terre River, northeast of Elkland, *Steyermark*, no. 24,514 (Mo). ST. CLAIR CO.: low woods around White Sulphur Spring, *Steyermark*, no. 24,401 (Mo). DALLAS CO.: base of slope along Mangua River, southwest of Long Lane, *Steyermark*, no. 24,231 (Mo). VERNON CO.: low open woods along creek, near Deerfield, *Palmer & Steyermark*, no. 42,140 (Mo, NY). MCDONALD CO.: low ground, Noel, *E. J. Palmer*, no. 4069 (Mo, US). ARKANSAS: MARION CO.: bottoms of White River, Flippin, *Demaree*, no. 20,640 (Mo, NY). SALINE CO.: bottoms of Saline River, Benton, *Demaree*, no. 8491 (US). CARROLL CO.: Eureka Springs, *E. J. Palmer*, no. 4439 (Mo). HEMPSTEAD CO.: woods, Fulton, *Bush*, no. 984 (Mo). LAFAYETTE CO.: Spirit Lake, *A. A. & E. G. Heller*, no. 4118.

LOUISIANA: WEST FELICIANA PARISH: deciduous woodland, Catalpa, *Pennell*, no. 4308 (NY). OKLAHOMA: ROGERS CO.: Verdigris, *Bush*, no. 429 (Mo). JOHNSTON CO.: open woods near Tishomingo, *H. W. Houghton* as *Stevens*, no. 3342. PAYNE CO.: Stillwater, *Eugene Blevins*, no. 90 (Mo). TEXAS: WITHOUT STATED LOCALITY: *Drummond*, no. 202 (paratype of the following). HARRIS CO.: rich shaded bottoms around Houston (data with sheet in Herb. Mo), *Lindheimer*, Fasc. II, no. 290 (type and isotypes of *Dipteracanthus micranthus*). BRAZORIA CO.: woods, Columbia, *Bush*, no. 1342 (Mo); San Bernardo, June 28, 1923, *Tharp*. JACKSON CO.: Lavaca River, Aug. 29, 1941, *Tharp*. PLATE 842.

As originally published in Species Plantarum (1753) *Ruellia strepens* (from *strepo*, to rustle, presumably from the dehiscing of the capsules) was a mixture. The plant of the Linnean Herbarium, which Linneaus had before him, has not been available and cannot be until after "the duration". Neither can I discuss the specimens cited in other Linnean works. The name was taken over from *Ruellia strepens, capitulis comosis* of Dillenius, Elth. ii. 330 (misprinted by L. as 300), t. 249, fig. 321 (our PLATE 863), a wholly different plant from that here treated, one of the species (our no. 11) with relatively low hirsute stem, pubescent oblong leaves, dense glomerules of relatively small flowers crowded in the upper axils, and the calyx-segments narrowly linear. The confusion prevailed for some decades (before and after 1753) but in 1771, in his *Observationes in Species Plantarum cum Emendationibus et Animadversionibus*, Mantissa Altera, pp. 315 et seq., Linnaeus redefined *Ruellia strepens* (p. 422) to stand only for the present species ". . . *Pedunculi* oppositi, laterales breves, triflori. *Bracteae* 2 oppositae, etiam 2 sub singulo flore laterali. *Calyx* 5partitus, lanceolatus" etc. He thus threw out the wholly different plant of Dillenius (with abundant fruit which, when pressed, promptly rustles) and restricted the name to the showy-flowered and usually infertile or only weakly fertile typical *R. strepens* which, except in the cleistogamous state (unknown to Linnaeus), rarely gets a chance to rustle! Schkuhr, Willdenow, Pursh, LeConte, Torrey, Gray, Engelmann, Nees, Britton and all others have consistently adopted the redefinition made in Mantissa Altera, and only confusion would result if the pre-Linnean and confused application of the name were forced. Our species, preeminently of calcare-

ous bottomland and bases of limestone bluffs, with great concentration in the Mississippi Basin (MAP 1), pushes down to the Atlantic area along the Susquehanna, Potomac, James, Santee and Savannah River systems. It is on the upper Roanoke, and, presumably, search may bring it to light farther down that valley, even in northeastern North Carolina. In the great accumulation of material before me, from some of the more representative larger herbaria, there is no evidence that it is common in either North or South Carolina; and from Georgia I have seen it only from tributaries of the Tennessee (thence the Mississippi) River, although (since it has been found at Aiken) it is probably along the Savannah in Georgia. The *Ruellia strepens, capitulis comosis* of Dillenius was raised from seed sent from Carolina and flowered in 1726: "Nata fuit haec species e seminibus Carolinensibus, & Septembri mense primum floruit anno 1726, sequentibus autem annis tota fere aestate". This plant (our no. 11), abundant in eastern North and South Carolina as well as reaching eastern Virginia, is inclined to grow in slightly dry and rather acid soils.

It is a very striking fact that the accumulated material before me shows forma *cleistantha* regularly and abundantly fruiting, while the typical form, with few peduncles from a few median axils and few showy, expanded flowers, is largely sterile. Of the 270 sheets of typical *R. strepens* before me only 12 (4⅖ *per cent.*) show 1 or 2 developed capsules (PLATE 841, FIG. 4); all of the 168 sheets of forma *cleistantha* are loaded with fruit or show the possibility of it.

When he reduced Gray's var. *cleistantha* to the rank of a form Mr. Scott McCoy reported on plants brought into the garden: "Each June it bloomed as the species and each fall it bore cleistogamous flowers as does the so-called variety *cleistantha* Gray." Further checks should be made in other regions for, if all the material in the United States National Herbarium, the Torrey and Britton Herbaria of the New York Botanical Garden, the herbaria of the Missouri Botanical Garden, the Philadelphia Academy of Sciences, the University of Pennsylvania and several smaller collections, added to the representation in the Gray Herbarium, can be taken (and I believe it can) as a fair average, there are some very important characters distinguishing the two

plants which one would not expect to find if forma *cleistantha* always develops from individuals which early in the summer were typical *R. strepens*. Typical showy-flowered *R. strepens* bears 1–3 flowers on few leafy-bracted peduncles from the median axils; forma *cleistantha* has the flowers more densely crowded in nearly sessile glomerules, usually from many, including the upper, axils. Of the 270 sheets of typical *R. strepens* before me 145 (nearly 54 *per cent.*) have elongate median peduncles 2–10 cm. long; when rarely such plants fruit (July 25, Va., *Fernald & Long*, no. 13,463; July 22, Ky., *Braun*, no. 3259; June 25, Mo., *Hasse*, no. 1094; July 7, Mo., *Steyermark*, no. 11,420; July 13, Mo., *Palmer*, no. 8275; August 27, Kans., *Norton;* etc.) they show no incipient sessile glomerules in the upper axils, such as one would expect if they always change to forma *cleistantha*. The peduncles are still there, up to autumn. Of the 168 sheets of forma *cleistantha* only 20 (11.5 *per cent.*) have such peduncles (not counting branches with subsessile glomerules). Furthermore, very many specimens with only glomerulate fruits in the middle and upper axils were collected pretty early in the season, June 17–August 18 (W. Va., *McElwee;* Ky., *Price;* Ill., *Eggert;* Mo., *Palmer*, no. 1310; Ark., *Heller & Heller*, no. 4118), their fruiting period overlapping the flowering period of typical *R. strepens*. It must be evident, then, that not always do typical early and showily flowering plants of *R. strepens* change late in the season into forma *cleistantha;* if they did so a much larger percentage of the latter would retain the elongate peduncles of the former, and the former, late in the season, would regularly bear crowded fruits in the upper axils. The problem is a promising one for the experimenter. Do the abundant seeds of the cleistogamous plant reproduce only the cleistogamous form or do they equally yield the typical showy-flowered and largely infertile plant? Carefully checked and numerous cultures are necessary before we can say with finality.

3. R. PEDUNCULATA Torr. Stem 1–7.5 dm. high, slender, firm, obtusely quadrangular or subterete, puberulent or minutely cinereous-pilose, with long internodes, simple, with axillary peduncles, to branched; the branches ascending and but slightly forking to more divergent and much divided, often bushy in habit: leaves ovate to ovate-oblong or lanceolate, short-petioled, tapering from slightly above base, pale green, puberulent,

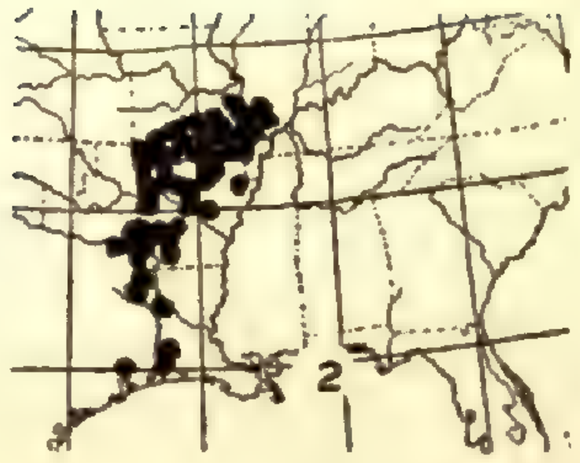
entire or very shallowly undulate; those of primary axis (above the rounded or obovate lowest ones) 3–11 cm. long and 2–4.5 cm. broad, the rameal smaller: flowers solitary at tips of simple 2-bracted peduncles or loosely cymose on the branches; the cymes, when developed, 2–several-flowered: calyx-segments linear-filiform, 0.5–1 mm. wide at base, thence tapering to very slender often flexuous tips, in maturity 1–3 cm. long, closely cinereous-hirtellous with slender-tipped spreading pubescence: corolla blue-violet, 2.5–5.5 cm. long; the slender tube about equaling the ampliate throat: ovary and capsule cinereous-puberulent; the capsule 1–2 cm. long; retinacula usually 6 or 8: seeds orbicular or suborbicular, cinereous, 2.5–3.5 mm. in diameter.—*R. pedunculata* Torr. ex Gray, Syn. Fl. N. Am. ii[1]. 325 (1878).—Woods, bluffs, rocky slopes, barrens, open fields, etc., in calcareous to circumneutral soil, western Louisiana and eastern Texas, north to southern Illinois, eastern and south-central Missouri and eastern Oklahoma. The following are representative. ILLINOIS: JACKSON CO.: Murphysboro, *Benke*, no. 4648 (US); mesophytic woods, Makanda, June 20, 1903, *Gleason;* dry upland or rocky woods, Grand Tower, *Gleason*, nos. 1793, 2654, 2655 (all as *R. strepens*); dry rocky limestone hillsides, Grand Tower, *Gleason*, no. 9007 (NY). JOHNSON CO.: rocky woods, Tunnel Hill, June 27, 1902, *J. Schneck* (NY). UNION CO.: dry sandstone bluff, Cobden, May 23, 1902, *F. S. Earle* (NY). [In Herb. Duke Univ. there is a specimen of *R. pedunculata*, bearing a label, "*Ruellia strepens*, Nees. Urbana, Ill. Oct. 4, 1884, W." with the heading "Herbarium of Merton B. Waite" and, printed above it, "Herbarium of A. B. Seymour". Since *R. strepens* is well known from the region of Urbana, where frequently collected, while there is no other evidence of *R. pedunculata* from northeast of the southwestern corner of Illinois, it is probable that in the wanderings of this material some transfer of labels has occurred]. MISSOURI: JEFFERSON CO.: rich woods in ravine, southwest of Crystal City, *Steyermark*, no. 1357 (Mo); dry copses, DeSoto, May 30, 1887, *Hasse* (Mo, US). STE. GENEVIEVE CO.: Bloomdale, *J. H. Kellogg*, no. 2004. CAPE GIRARDEAU CO.: wooded limestone slopes, Hickory Ridge, west of Delta, *Steyermark*, no. 20,811 (Mo). DUNKLIN CO.: Campbell, uncommon, *Bush*, no. 343 (Mo, NY). MADISON CO.: rocky open woods, near Fredericktown, *E. J. Palmer*, no. 31,608 (Mo). WAYNE CO.: low woods in Happy Hollow, north of Kime, *Steyermark*, no. 6318 (Mo). BUTLER CO.: rocky upland woods, Poplar Bluff, *E. J. Palmer*, no. 16,345 (Mo); cherty slopes bordering lowlands along Mud Creek, northwest of Rombauer, *Steyermark*, no. 11,422 (Mo). IRON CO.: Arcadia, *Greenman*, no. 3750 (Mo, Phil); rocky open woods near Ironton, *E. J. Palmer*, no. 18,111. REYNALDS CO.: cherty slopes, south of Oates, *Steyermark*, no.

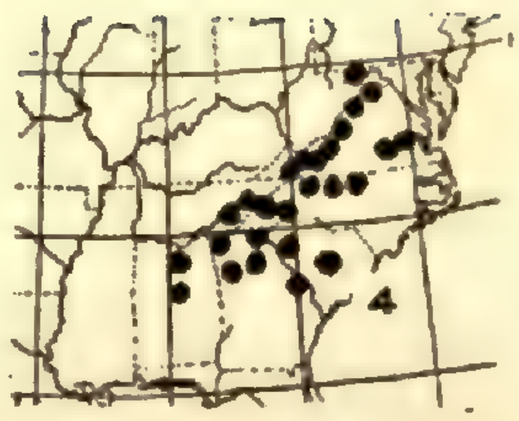
19,724 (Mo). CARTER CO.: rocky woods, Van Buren, *J. H. Kellogg*, no. 15,300 (Mo). PHELPS CO.: Jerome, June 11, 1914, *Kellogg* (Mo). SHANNON CO.: rocky woods, Monteer, *Bush*, nos. 6401 and 6401 A. TEXAS CO.: wooded limestone slopes at base of bluffs along Big Pine River, southeast of Prewitt Spring, *Steyermark*, no. 20,077 (Mo). OREGON CO.: stony grove, Thayer, *F. W. Pennell*, no. 11,521 (Phil). OZARK CO.: cherty limestone slopes on top of bluff along White River, northeast of Dormio, *Steyermark*, no. 10,417 (Mo). DOUGLAS CO.: limestone glade and cherty open woods, between Roosevelt and Richville, *Steyermark*, no. 19,165 (Mo). WRIGHT CO.: open hillside, west of Cedar Gap, *O. E. Lansing*, no. 3020. LACLEDE CO.: cherty bottom of Pine Creek Hollow, southwest of Nebo, *Steyermark*, no. 25,159 (Mo). WEBSTER CO.: limestone outcrops, south of Fordland, *Steyermark*, no. 19,239 (Mo). TANEY CO.: common in woods, Swan, *Bush*, no. 236 (Mo, US); open rocky ground near Gretna, *E. J. Palmer*, no. 19,224. STONE CO.: dry rocky hillside by James River, *E. J. Palmer*, no. 5831 (Mo, US). BARRY CO.: dry woods around Eagle Rock, Sept. 24, 1896, *K. K. Mackenzie* (Mo, NY); Eagle Rock, *Bush*, nos. 78 and 1551 (Mo, NY, US). MCDONALD CO.: dry ground, *Bush*, no. 283. ARKANSAS: CRAIGHEAD CO.: open sandy soil, Jonesboro, *F. W. Pennell*, no. 11,510, as *R. ciliosa* (Phil); open woods, Bono, *Demaree*, no. 3519 (Mo). SHARP CO.: Hardy, *W. H. Emig*, no. 152 (Mo). FULTON CO.: dry cherty forest, Mammoth Spring, *F. W. Pennell*, no. 11,558 (Phil). IZARD CO.: sandstone, east of Guion, *Pennell*, no. 10,692 (NY, Phil). LONOKE CO.: fallow fields, Carlisle, *Demaree*, no. 17,516 (Mo, NY). DREW CO.: woods, Monticello, *Demaree*, no. 14,969 (Mo, NY). FAULKNER CO.: open fields, Conway, as *R. ciliosa*, *Flora A. Hass*, no. 1746 (US). GARLAND CO.: near Hot Springs, *Runyon*, nos. 1142 (NY) and 1439 (US). PULASKI CO.: low ridges, Fort Roots, *Demaree*, no. 17,301 (Mo, NY); Little Rock, *Demaree*, nos. 17,325 (Mo, NY) and 17,516 (Mo, NY). POPE CO.: Nogo, *Geo. M. Merrill*, no. 342 (Mo). NEVADA CO.: southeast of Prescott, June 3, 1912, *Mabel P. Hollister* (US). CARROLL CO.: dry open ground, Eureka Springs, *E. J. Palmer*, nos. 4378 (Mo, US) and 20,483 (NY). HEMPSTEAD CO.: near McNab, *Greenman*, no. 4417 (Mo). FRANKLIN CO.: rocky hillside, Ozark, *F. W. Pennell*, no. 10,622 (NY, Phil). HOWARD CO.: Baker Springs, Oct. 5, 1909, *J. H. Kellogg*. BENTON CO.: 1889, *E. N. Plank* (NY). WASHINGTON CO.: Savoy, May 18, 1922, *E. T. Wherry* (US). SEBASTIAN CO.: Fort Smith, 1853–4, *J. M. Bigelow*, paratypes (US). LOUISIANA: WITHOUT CITED STATION: *Hale*, ISOTYPE. NATCHITOCHES PARISH: dry open ground, Natchitoches, *E. J. Palmer*, no. 7511 (Mo, NY, US). ST. LANDRY PARISH: dry woods, Opelousas, *Carpenter & Hale* (US). JEFFERSON DAVIS PARISH: knolls in low prairies, Welsh, *E. J.*

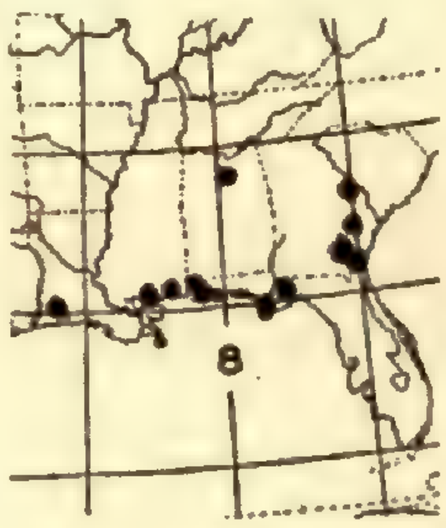
Palmer, no. 7649 (US). OKLAHOMA: LE FLORE CO.: woods, near Page, *G. W. Stevens*, no. 1423. MCCURTAIN CO.: woods near Idabel, *H. W. Houghton* as *G. W. Stevens*, nos. 3625 and 3638. TEXAS: BOWIE CO.: near Texarkana, *A. A. & E. G. Heller*, no. 4171 (Mo, NY, US). HARRISON CO.: woods, Marshall, *Bush*, no. 781 (Mo). CASS CO.: rocky woodland, Hughes Springs, *Biltmore Herb.*, no. 10,679[a] (US). CHEROKEE CO.: dry sandy ground, Jacksonville, *E. J. Palmer*, no. 8600 (Mo, NY, US). ANDERSON CO.: Palestine, April 19, 1895, *E. N. Plank* (NY). UPSHUR CO.: sandy woods, Big Sandy, May 28, 1901, *Reverchon* (Mo); common in sand, Big Sandy, *Reverchon*, no. 2535 (Mo, NY). SAN AUGUSTINE CO.: open woods, *Geo. L. Crocket* (US). HARRIS CO.: Houston, 1917, *Ada Hayden*. PLATE 843; MAP 2.

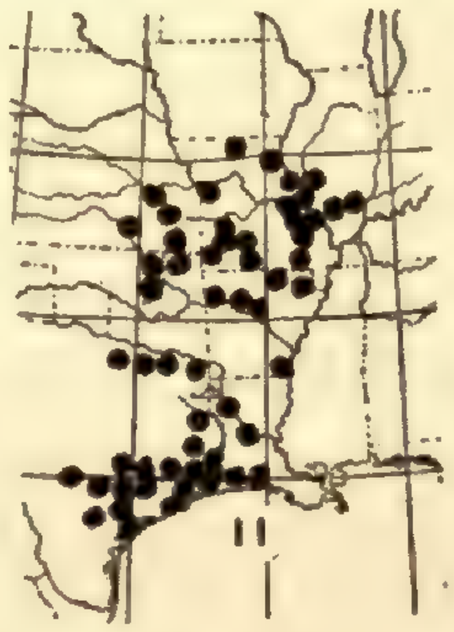
In view of its very definite characters it is remarkable that the earlier collectors seem not to have secured *Ruellia pedunculata* and that it was not described until 1878. It is not improbable that Nees included it in his complex and chiefly tropical *Cryphiacanthus barbadensis*. In his treatment in DC. Prodr. xi. 197 (1847) Nees gave the broad range of the latter as tropical America, thence to Virginia, Carolina and Texas ("In Americae calidioris . . . inde a prov. Virginiâ, Carolinâ et Texas") but under the citation of specimens he gave nothing from the United States. Since his *C. barbadensis* had long peduncles with cymes, subovate leaves, and subulate-acuminate calyx-segments, the Texan element was presumably *R. pedunculata*. The representatives of the latter in Virginia and Carolina are the two following, only the first of which has "pedunculis subcymosis".

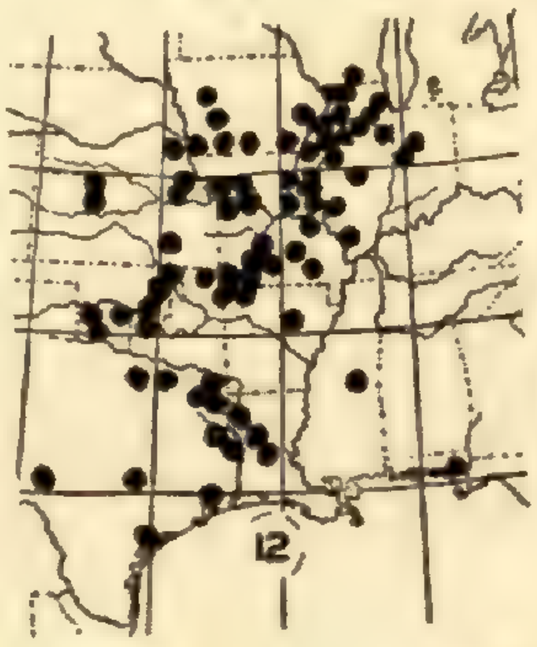
4. R. **pinetorum,** sp. nov. (tab. 844), planta habitu *R. pedunculatae;* caule 1–3 dm. alto puberulo obtuse quadrangulato vel subtereto subsimplice vel divergenter ramoso vel ramosissimo internodiis elongatis; foliis oblongis vel elliptico-lanceolatis breviter petiolatis obtusis vel subacutis subcoriaceis minute lineolato-puberulis vel glabratis integris vel undulatis, majoribus 2–3.8 cm. longis 0.8–1.8 cm. latis; pedunculis axillaribus 0.2–3 cm. longis 1–3-floris, bracteolis oblongis petiolatis calyce brevioribus; calycis laciniis lineari-acicularibus deinde 1.3–2 cm. longis a basi 0.5–1 mm. latis attenuatis dorso cystolithos gerentibus; corollis caeruleo-purpureis 3–4 cm. longis, tubo cylindrico 1.5–2 cm. longo, fauce 1–1.5 cm. longo supra 6–10 mm. diametro, limbo (expanso) 2–4 cm. lato; capsulis glabris 1.2–1.6 cm. longis; seminibus orbicularibus 3 mm. diametro.—Low pine barrens of the Coastal Plain, South Carolina (possibly Virginia) to northern Florida and Louisiana, apparently local. SOUTH CAROLINA: HORRY CO.: low pine barrens, July 28, 1936, *F. G.*

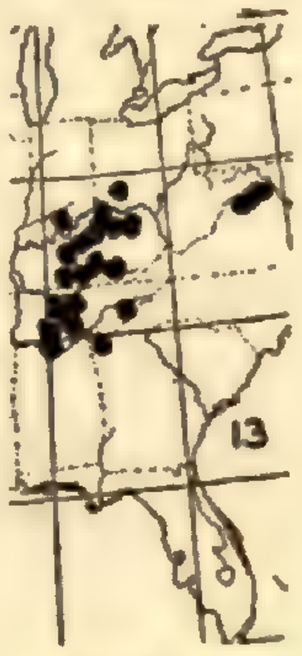


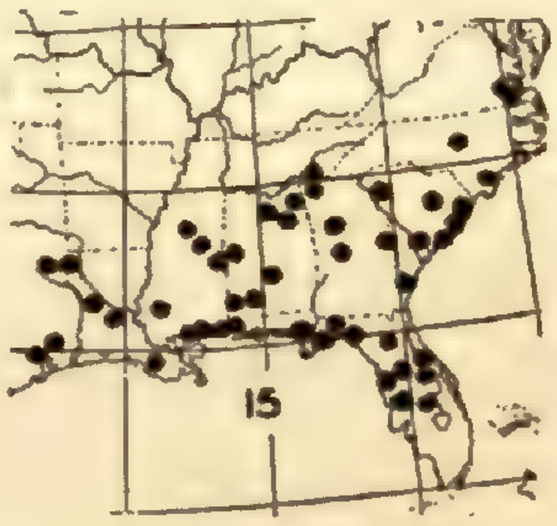


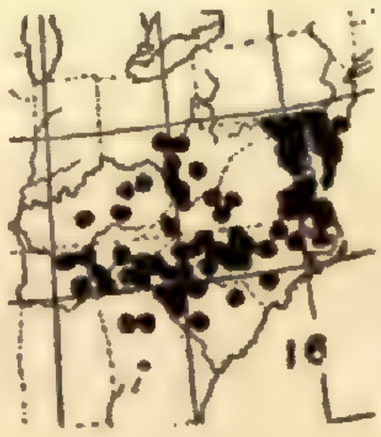


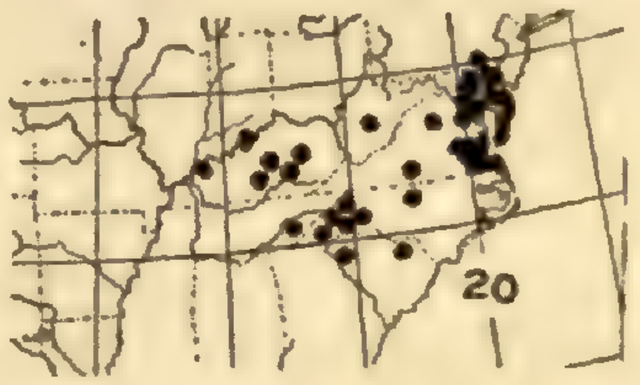












Ranges of RUELLIA. Map 1, R. STREPENS; 2, R. PEDUNCULATA; 3, R. PINETORUM; 4, R. PURSHIANA; 5, R. HETEROMORPHA; 6, R. CILIOSA; 7, R. SUCCULENTA; 8, R. NOCTIFLORA; 9, R. HUMILIS, var. TYPICA; 10, R. HUMILIS, var. FRONDOSA; 11, R. HUMILIS, var. LONGIFLORA; 12, R. HUMILIS, var. EXPANSA; 13, R. HUMILIS, var. CALVESCENS; 14, R. CAROLINIENSIS, var. TYPICA; 15, R. CAROLINIENSIS, var. SEMICALVA; 16, R. CAROLINIENSIS, var. MEMBRANACEA; 17, R. CAROLINIENSIS, var. NANELLA; 18, R. CAROLINIENSIS, var. CHELONIFORMIS; 19, R. CAROLINIENSIS, var. SALICINA; 20, R. CAROLINIENSIS, var. DENTATA

Tarbox, no. 800, TYPE in U. S. Nat. Herb. FLORIDA: CALHOUN CO.: low grounds, Iola, May, 1896, *Chapman*, three specimens, one unnamed, one marked "n. sp.", with entry of an unpublished name which appears in American herbaria on sheets of at least two other and quite different species (therefore unwise to take up), the third marked "sp. nov. affin. *R. pedunculata*" (Mo). ALABAMA: WASHINGTON CO.: Fruitdale, July, 1904, as *R. pedunculata, Southern Floral Nursery Co.* (Mo). MISSISSIPPI: WAYNE CO.: Waynesboro, Aug. 8–9, 1896, *C. L. Pollard*, as *R. strepens*, no. 1220 (Mo, NY, US). HARRISON CO.: Cuevas, Sept. 8, 1900, *Lloyd & Tracy*, no. 346 (NY). LOUISIANA: ST. TAMMANY PARISH: Covington, Sept., 1919, as *R. parviflora, G. Arsène*, no. 11,687 (US). ORLEANS PARISH: New Orleans, 1832, *T. Drummond*, nos. 257 in part (as *R. strepens*); 258 in part and 259 in part (as *R. longiflora*), the numbers inextricably confused, two of them appearing on one label. CALCASIEU PARISH: vicinity of Lake Charles, May 28, 1904, and other dates (not given) in 1904, *Andrew Allison*, nos. 57, 261 and 297, all as *R. pedunculata* (all US). MAP 3.

Ruellia pinetorum is the southeastern Coastal Plain representative of *R. pedunculata* and most of the few specimens seen were identified with that species which centers on the Ozark Upland. Chapman correctly understood it as a new species of this relationship but, as explained, the name he proposed but did not publish has been entered as a wholly new name on many sheets of at least two other species and should not be taken up. The finest material is that in the National Herbarium collected by Mr. Tarbox in low pine barrens of Horry County, South Carolina. I am, therefore, treating this as the type. In the chiefly Ozarkian *R. pedunculata* the leaves are more ovate, the primary ones 3–11 cm. long and 2–4.5 cm. wide; in *R. pinetorum* the leaves are oblong to elliptic-lanceolate and only 2–3.8 cm. long by 0.8–1.8 cm. wide. In *R. pedunculata* the broad bracts, especially in the simpler-stemmed plant with peduncles bearing solitary terminal flowers, nearly equal to greatly exceed the calyx; in *R. pinetorum* the narrow bracts are much shorter than the calyx. In *R. pedunculata* the calyx is copiously hirtellous with divergent sharp-tipped trichomes; in *R. pinetorum* glabrous or nearly so and closely invested with elongate and partially imbedded cystoliths. In *R. pedunculata* the corolla-tube and the ampliate throat are subequal in length; in *R. pinetorum* the tube is much longer than the less ampliate throat. In *R. pedunculata* the capsule is cinereous-puberulent; in *R. pinetorum* glabrous.

The very few specimens assembled indicate that *Ruellia pinetorum* is a very local plant. Now that attention is called to it, it is hoped that fuller material will become available. As noted under *R. pedunculata*, it is probable that this is the plant intended by Nees when, in DC. Prodr. xi. 197 (1847), he noted his quite different tropical *Cryphiacanthus barbadensis* as extending northward to Virginia and Carolina. No other plant known in the East satisfies his "pedunculis subcymosis petiolo longioribus vel et folium aequantibus superantibusve". We do not now know *R. pinetorum* from Virginia but so many species are now known to "jump" from eastern South Carolina or southeastern North Carolina to southeastern Virginia that *R. pinetorum* may well (before the destruction of most of the pine barrens) have been one of them. Really quite as closely related to the Ozarkian *R. pedunculata*, as is the Coastal Plain *R. pinetorum*, is the following beautiful species which centers on the Appalachian Upland.

5. R. **Purshiana,** sp. nov. (TAB. 845 et TAB. 846, FIG. 3), planta habitu plantae simplicissimae *R. pedunculatae;* caule simplice recto vel ramis erectis paucis gracile 1.5–6 dm. alto cinereo-puberulo internodiis elongatis; foliis membranaceis majoribus elliptico- vel lanceolato-ovatis basi attenuatis apice obtusis vel acutis integris vel subtile undulatis ad venas puberulis plus minusve hirtellisque vel glabratis, axis primarii 3–6-jugis remotis 2.5–10 cm. longis 1.5–4.3 cm. latis, petiolo gracili 0.5–2 cm. longo; pedunculis 1-floris 0.2–3 cm. longis axillaribus ad 1–2 (–4) nodos imos apice bracteatis; bracteis ellipticis vel ovalibus; axillis superioribus efloriferis; calycis segmentis anguste linearibus 0.7–1.2 mm. latis apice attenuatis minute cinereo-pilosis vel -hirtellis deinde 1.6–2.8 cm. longis; corollis 3–5 cm. longis caeruleo-purpureis vel pallide purpureis vel albescentibus, tubo cylindrico 1.5–3 cm. longo, fauce ampliato supra 0.8–1.4 cm. diametro, limbo (expanso) 3–4 cm. lato; capsulis minute strigoso-hirtellis vel pilosis 1.5–1.8 cm. longis; retinaculis 8.—*R. ciliosa*, var. *hybrida* Gray, Syn. Fl. N. Am. ii[1]. 326 (1878) in part only. *R. parviflora* sensu Britton in Britton & Brown, Ill. Fl. ed. 2, iii. 241, fig. 3891 (1913) at least as to fig., not *R. parviflora* (Nees) Britt. (1901) at least as to basonym, *Dipteracanthus ciliosus*, var. *parviflorus* Nees (1842).—Dry to moist woods, bluffs, granitic or calcareous slopes, etc., western Maryland, south along the mountains and locally on the Piedmont to eastern Virginia, central South Carolina, Georgia and Alabama. MARYLAND: FREDERICK CO.: *W. E. A. Aiken*, as *R. strepens*, altered

to *R. caroliniensis* (Phil). VIRGINIA: FREDERICK CO.: woods, Cedar Creek, June 2, 1929, *Hunnewell*, no. 11,135 (FWH); limestone cliffs, Cedar Creek, June 5, 1936, *Hunnewell* (VPI); both as *R. caroliniensis*, var. *parviflora;* Meadow Mills, June 9, 1935, *O. M. Freeman* (USNA), as *R. ciliosa.* ROCKINGHAM CO.: Paul's Fort, *Frederick Pursh* (Phil). ROCKBRIDGE CO.: Natural Bridge, May 28 and 29, 1909, *E. B. Bartram*, as *R. parviflora*, one sheet (Gray) changed by later student to *R. humilis* "Pursh", another (Phil) to *R. caroliniensis;* "Glasgow", June 1, 1891, *J. R. Churchill*, as *R. ciliosa*, var. *ambigua* (Mo). BOTETOURT CO.: Indian Rock, June, 1887, *H. E. Wetherill*, as *R. strepens* (Pa). WASHINGTON CO.: shaly banks, vicinity of Mendota, *L. G. Carr*, no. 572, as *R. caroliniensis.* ROANOKE CO.: Roanoke, May 29, 1890, *Brown, Hogg, Vail, Timmerman, Britton & Britton*, as *R. ciliosa*, var. *ambigua* (NY); wooded limestone slope along Roanoke River at Dixie Caverns, July 6, 1942, *C. E. Wood*, Jr., no. 3673, as *R. caroliniensis.* BEDFORD CO.: July 8, 1871, *A. H. Curtiss*, one of the several quite dissimilar sheets marked by Gray as his *R. ciliosa* var. *ambigua*, one of the Curtiss specimens tagged by a later student as *R. caroliniensis*, the other as *R. hybrida.* AMELIA CO.: June 5, 1937, *J. B. Lewis*, no. 626, as *R. ciliosa*, var. *parviflora* (VPI). HENRICO CO.: Richmond, *De Chalmot*, as *R. pedunculata* (US). NORTH CAROLINA: ORANGE CO.: open woods, Upper New Hope Creek, Duke Forest, May 27, 1932, *Blomquist*, no. 4911, as *R. caroliniensis* (Duke); New Hope Creek, Duke Forest, May 20, 1933, *Blomquist & Oosting*, no. 3364, as *R. parviflora* (Duke); dry bank near University Lake, on Neville's Creek, northwest of Chapel Hill, May 29, 1940, *Radford & Stewart*, no. 654a, as *R. ciliosa* (NC). GUILFORD CO.: near High Point, May 22, 1902, *Biltmore Herb.*, no. 14718[d], as *R. parviflora* (NY, US). FORSYTH CO.: Salem, *Schweinitz*, as *R. strepens*, altered by others, first to *R. ciliosa*, later to *R. caroliniensis* (Phil); woods, Winston-Salem, Aug. 20, 1921, *P. D. Shallert*, as *R. ciliosa*, May 30, 1934, *Schallert*, no. 6509, as *R. strepens* (Schallert). RUTHERFORD CO.: Cuba, June 27, 1887, *L. W. Lynch*, no. 36, as *R. strepens* (NC). MADISON CO.: Marshall, May 28, 1904, *Biltmore Herb.*, no. 14718[c], as *R. parviflora* (US); dry woods, Hot Springs, June 2, 1899, *J. R. Churchill*, as *R. ciliosa*, var. *parviflora* (Mo). SOUTH CAROLINA: SUMTER CO.: Sept., 1937, *E. E. Holdaway*, no. 73, as *R. ciliosa* (Duke). ANDERSON CO.: 1886, *Miss F. Earl*, as *R. strepens* (VPI); Andersonville, 1884, *N. H. E.* (NY). OCONEE CO.: Keowee, May 20, 1906, *H. D. House*, no. 2171, as *R. parviflora* (NY). GEORGIA: WITHOUT STATED LOCALITY: mountains of Georgia, *Chapman*, as *R. ciliosa*, var. *ambigua* (Mo). BURKE CO.: woods, Shell Bluff on Savannah River, April 23, 1936, *Leeds & Harper*, no. 2756, as *R. parviflora* (Phil). OGLETHORP CO.: granite outcrop west of Lex-

ington, May 28, 1934, *Francis Harper*, as *R. parviflora* (Phil). DEKALB CO.: Stone Mountain, May 23, 1897, *Henry Eggert* (Mo); mixed woods, Emory University campus, April 30, 1936, *Don Eyles*, no. 695, as *R. parviflora* (Duke). FLOYD CO.: Rome, *Chapman* (Mo), as *R. ciliosa*, var. *hybrida*; dry hillsides near Silver Creek, May 11, 1899, *Biltmore Herb.*, no. 849[d], as *R. ciliosa* (TYPE in Herb. U. S. National Herb.). TENNESSEE: KNOX CO.: Knoxville, May 14, 1889, *Lamson-Scribner*, as *R. strepens*, changed by later students to *R. ciliosa* and to *R. parviflora* (US); woods and groves, Knoxville, July, 1897, *Ruth*, no. 9572, as *R. strepens* (NY); woodlands, Knox County, May, 1898, *Ruth*, no. 737, as *R. strepens* (NY). ALABAMA: BLOUNT CO.: rocky woodlands, Bangor, May 20, 1902, *Biltmore Herb.* no. 14,718, as *R. ciliosa*, var. *parviflora* (US). JEFFERSON CO.: Birmingham, May 24, 1901, *F. S. Earle*, as *R. parviflora* (NY). MAP 4.

5a. Forma **claustroflora,** f. nov. (TAB. 846, FIG. 1 et 2), floribus in glomerulis axillaribus aggregatis, glomerulis ad nodos omnes gestis; corollis tubulosis clausis 4–8 mm. longis apice dense pilosis; capsulis numerosis.—VIRGINIA: WITHOUT STATED LOCALITY: 1843, *Gray & Sullivant*, as *R. strepens*. ROCKBRIDGE CO.: "ex umbrosis Virginiae juxta *Virginia Natural Bridge*", Sept. 14, 1884, *John Ball* (US), identified by a later student as *R. strepens*, afterward changed to *R. parviflora;* Natural Bridge, Sept. 4, 1885, *N. L. & E. G. Britton*, as *R. strepens*, var. *cleistantha* (NY). TENNESSEE: COCKE CO.: within three miles of Wolf Creek Station, Aug. 31, 1897, *Kearney*, no. 863, as *R. ciliosa*, var. *hybrida* (Mo and NC), TYPE in Herb. Missouri Botanical Garden.

Ruellia Purshiana, named for FREDERICK PURSH, who first collected the species in the mountains of Virginia, is, when assembled from the very miscellaneous covers in which it has been confused, under 11 misidentifications, with no less than 7 species, stands out as a remarkably definite species of the Appalachian Upland. Although this is doubtless the plant chiefly intended by Gray when he conceived his *R. ciliosa*, var. *ambigua*, "as if a hybrid between *R. ciliosa* and *R. strepens*, with the aspect of the latter, but the calyx of the former", it can not be overlooked that Gray promptly lost his bearings in applying the name *R. ciliosa*, var. *ambigua*, for sheets carrying the printed annotation-slip "Syn. Fl. N. Amer." and marked by Gray as *R. ciliosa*, var. *ambigua* belong to no less than five species: the present one (in Herb. Gray); a Floridan sheet in Torrey's Herbarium containing at least three species, none of them like anything else included by Gray in his var. *ambigua;* and a mixed sheet in Herb. Gray, con-

taining a sprig of *R. pedunculata* Torr. from Arkansas and the top of a plant of the very different Texan *R. Drummondiana* (Nees) Gray (this mixed sheet later misidentified as *R. "caroliniensis"*). I have not located the Kentucky plant included by Gray under *R. ciliosa*, var. *ambigua*. Even though we can infer that by his description and note Gray meant chiefly the plant I am here calling *R. Purshiana*, it is evident that, as he originally labelled specimens, the name *R. ciliosa*, var. *ambigua* was emphatically a *nomen ambiguum*. The name has subsequently been further misapplied. I am, therefore, assigning to the species with somewhat the aspect of *R. strepens* but with much more slender calyx-segments a new name, typified by a characteristic sheet of specimens.

That *Ruellia Purshiana* simulates very extreme plants of *R. strepens* with short leaves there can be no question. Some specimens of the latter, especially those from upland and dry habitats, consequently with greatly reduced stature and abbreviated leaves, are superficially similar (such specimens as the following: dry ground, Chickamauga Park, Georgia, May 25, 1911, *Churchill* (G); open woodlands, Coalgrove, Ohio, *Biltmore Herb.*, no. 4500[f] (US); dry ground near Chattanooga, Tennessee, May 27, 1911, *Churchill;* and dry soil, Stevenson, Jackson County, Alabama, *Biltmore Herb.*, no. 4500[a] (US)). There the resemblance stops, except for the possibly significant fact that both species have the showy flowers mostly solitary on few axillary peduncles and rarely producing fruit, and also have cleistogamous forms with glomerules of several highly fertile flowers in many of the upper axils. In *R. strepens* the stem is glabrous, pilose in lines or rarely over the whole surface; the lanceolate calyx-segments are flat to the tip, 2–4 mm. broad, and conspicuously villous-ciliate; and the capsules glabrous. *R. strepens* is usually a plant of rich calcareous woods, oftenest on wooded bottoms, with its greatest concentration in the Mississippi Basin (MAP 1). *R. Purshiana* (MAP 4) is a plant of dry rocky or upland habitats, sometimes on limestones but often (as on Stone Mountain) in granitic or somewhat acid soils. Its stem is closely cinereous-puberulent; its calyx-segments linear and only 0.7–1.2 mm. wide below the middle, thence tapering to almost thread-like tips, and its surfaces are densely cinereous-hirtellous. The capsules too are

closely and minutely hirtellous. *R. Purshiana* was illustrated, erroneously as *R. parviflora*, in Britton & Brown, Ill. Fl. ed. 2, iii. fig. 3891. It certainly has nothing to do with the type of *R. parviflora*, which rests upon *Dipteracanthus ciliosus*, var. *parviflorus* (see p. 2).

In its minutely puberulent and slender stem, its slender calyx-segments and pubescent capsule *Ruellia Purshiana* is similar to the simpler-stemmed and least floriferous states of the chiefly Ozarkian *R. pedunculata* (MAP 2); but in these least branching plants of *R. pedunculata* (PLATE 843) the peduncles are soon widely divergent; the linear-acicular calyx-segments taper from base to apex; the showy flowers are quite fertile and regularly followed by capsules. So far as we know *R. pedunculata* does not have a cleistogamous form.

Although *Ruellia Purshiana* has often been identified as *R. ciliosa* Pursh, *R. caroliniensis* (Walt.) Steud., *R. parviflora* (Nees) Britton, *R. hybrida* Pursh, and even as *R. humilis* Nuttall, such identifications merely reflect the general lack of clarity regarding specific characters and the current and still inevitable vagueness about the early-proposed species. The earliest of these names or their basonyms is *Anonymos caroliniensis* Walt. Fl. Carol. (our no. 11). Although no specimen now exists as type of Walter's species, his remarkably detailed description, "caule tetragono hirsuto; foliis . . . hirsutis, . . . ; floribus sessilibus purpureis", surely does not apply to *R. Purshiana*. *R. ciliosa* Pursh (our no. 7) from near Savannah, was a branching plant, with subsessile ovate-oblong (really, apparently, obovate) leaves with margins and veins ciliate with long white hairs, the calyx-segments four times shorter than the corolla-tube (calycis laciniis subulatis tubo corollae quadruplo brevioribus). Such a plant could not be *R. Purshiana;* in fact, when Pursh twice collected the latter in the mountains of Virginia, he did not venture to name it. *R. hybrida* Pursh (see discussion under no. 11) also from Savannah, is quite as remote: much branched (ramosissima) and hirsute with white hairs, the oblong leaves densely hirsute, etc. *R. humilis* Nutt. (our no. 10), an essentially sessile-leaved and usually freely divergent-branched plant, originally from Arkansas, has nothing to do with *R. Purshiana;* and as to *R. parviflora* (see p. 2), that ill-defined name goes back to *Dip-*

teracanthus ciliosus, var. *parviflorus* Nees, from the Kentucky River, and with an impossible description for any North American member of *Ruellia:* with petioles 3–6 inches long—foliis paulo longiori petiolo (3–6-pollicari)! Only by substituting for "petiolo" the word "pedunculo" could one make much sense out of Nees' diagnosis (if his plant was a *Dipteracanthus* and related to *D. ciliosus*) but even then his var. *parviflorus* remains wholly vague. It is not a good basis for the name of a common species with petioles rarely 1 cm. long, and surely it was not *R. Purshiana*.

6. R. **heteromorpha,** sp. nov. (TAB. 847 et 848), planta dimorpha vel plus minusve heteromorpha. CAULIBUS VERNALIBUS 1–3 basi plerumque decumbentibus jam adscendentibus simplicibus vel divergenter ramosis 0.4–4 dm. altis puberulis plus minusve patenter villoso-hirsutis, nodis 3–5 (–10), internodiis 0.5–5 cm. longis; foliis membranaceis obovatis vel ellipticis vel oblanceolatis breviter petiolatis integris vel obscure undulatis plus minusve lineolato-strigillosis supra villoso-strigosis basin versus villoso-ciliatis subtus strigoso-hispidis glabratisve, laminis maturis 1.5–4.5 cm. longis 0.8–2.5 cm. latis; pedunculis perbrevibus axillaribus ad 1–3 nodos superiores bracteatis; bracteis oblongis; calycis segmentis lineari-attenuatis vix 1 mm. latis villoso-ciliatis 1.5–2 mm. longis; corollis (rarissime 2) 3–5.5 cm. longis coeruleo-purpureis vel pallide caerulescentibus late infundibuliformibus, tubo cylindrico 1.5–3 cm. longo, fauce obconico supra 1–2 cm. diametro, limbo (expanso) 3–4.5 cm. lato; capsulis glabris 1.1–1.6 cm. longis; retinaculis 6 vel 8. CAULIBUS SEROTINIS decumbentibus vel prostratis elongatis ad 6 dm. longis deinde ramosissimis, floribus in glomerulis axillaribus terminalibusque aggregatis, corollis plerumque clausis clavato-tubulosis cleistogamicis 1–3 cm. longis, vel corollis expansis reductisque; seminibus subrotundis 2.5–3.5 mm. diametro. *R. hybrida* sensu Small, Fl. Se. U. S. 1084 (1903), presumably not Pursh, Fl. Am. Sept. ii. 420 (1814).—Dry sands among pines or palmettos, Keys and Everglades, north to east-central FLORIDA: VOLUSIA CO.: moist pine barrens, near Seville, Aug. 1, 1900, *A. H. Curtiss*, no. 6701A (US), July 30, 1909, *Curtiss*, no. 6701, as *R. ciliosa*, var., vernal fl. BREVARD CO.: scrub, south of Eau Gallie, Dec. 1, 1919, *Small, Britton & De Winkeler*, no. 9200 (NY, US), later state, as *R. parviflora*. ST. LUCIE CO.: (formerly included in Brevard Co.): edge of pond, Okeechobee region, April 18, 1903, *Fredholm*, no. 5808, vernal fl., as *R. ciliosa*, annotated in one herbarium (US) as *R. parviflora*, in another (G) as *R. carolinienssis*, with an unpublished varietal name); Indian River, *Edw. Palmer*, no. 348 (Mo), as *R. strepens*. DE SOTO CO.: dry gravelly

soil, below Arcadia, March 14, 1926, *Mary H. Williams* (Phil), as *R. ciliosa*, later annotated with an unpublished specific name. LEE CO.: Owanita, March 18, 1907, *Wm. Kellogg*, vernal fl., as *R. ciliosa*, later annotated as undescribed var. of *R. caroliniensis;* among palmettos, vicinity of Fort Myers, March 21, 1916, *Jeanette P. Standley*, no. 70, vernal fl., as *R. humilis*, later annotated like the last (G) and as *R. parviflora* (US) and as an undescribed species (Phil); in pineland, vicinity of Fort Myers, May 4, 1916, *J. P. Standley*, no. 425, vernal fl. (US), as *R. humilis*, later annotated as *R. parviflora;* in pineland, Mullock Creek District, about 8 miles southeast of Fort Myers, May–June, 1917, *J. P. Standley*, no. 444, vernal fl., as *R. humilis*, annotated (G) as an unpublished var. of *R. caroliniensis*, (Phil) as an unpublished species, and (US) as *R. parviflora;* sandy pine woods along road to Coconut, April 14, 1930, *Moldenke*, no. 968, vernal fl. (Duke, Mo, NY). DADE CO.: dry sandy soil among palmettos, Buena Vista, Jan. 17, 1930, *Moldenke*, no. 426 (Duke, Mo, NY), as *R. hybrida*, vernal fl. and fr.; pinelands near Little River, Feb., 1917, *W. E. Safford* (US), as *R. hybrida*, later annotated as *R. parviflora;* Miami, April 4–7, 1898, *Pollard & Collins*, no. 233 (US), as *R. humilis*, later annotated as *R. parviflora*, April 1, 1903, vernal fl., *N. L. Britton* (US), as *R. hybrida*, later annotated as an unpublished var. of *R. caroliniensis*, March 14, 1917, *H. B. Meredith* (Phil), vernal fl., passing to later stage, as *R. ciliosa*, later annotated as an unpublished species; pinelands between Miami and Kendall Station, Nov. 5, 1906, *Small & Carter*, no. 2603 (NY), later stage, as *R. hybrida*, later annotated as unpublished var. of *R. caroliniensis;* pinelands between Cocoanut Grove and Cutler, Oct. 31–Nov. 4, 1903, *Small & Carter*, no. 1273 (NY as *R. hybrida*, Phil as *R. parviflora*, the former later annotated as an undescribed species), later stage; pinelands about Sykes Hammock, Everglade Keys, March 15, 1915, *Small, Mosier & Simpson*, no. 5772, as *R. hybrida*, later annotated as an undescribed var. of *R. caroliniensis*—TYPE of *R. heteromorpha* in Herb. N. Y. Bot. Gard., vernal fl., passing to later stage; pinelands about Goodburn Hammock, Everglade Keys, June 31, 1915. *Small & Mosier*, no. 6381 (NY); pinelands between Cutler and Longview Camp, Nov. 9–12, 1903, *Small & Carter*, no. 1097, later state, labeled and annotated like the last; pinelands between Long Prairie and Camp Longview, Oct. 31, 1906, *Small & Carter*, no. 2695 (NY), later state, labeled and annotated like the last; between Peter's and Long Prairie, Nov., 1906, *J. J. Carter*, no. 173 (Phil), as *R. parviflora*, later annotated as an undescribed species; pinelands about Humbugus Prairie, Feb. 28, 1915, *Small & Mosier*, no. 5555 (NY), later state, as *R. hybrida*, later annotated as a var. of *R. caroliniensis;* pinelands between Peter's Prairie and Homestead, Nov. 10,

1906, *Small & Carter*, no. 2701 (NY), later state, named as the last; pinelands about Ross-Costello Hammock, Everglades Keys, June 24, 1915, *Small, Mosier & Small*, no. 6552, later state, as *R. hybrida*. MONROE CO.: woods, Pine Key, *Blodgett*, later state; pinelands, Big Pine Key, May 1, 1917, *Small*, no. 8142, vernal fl., as *R. humilis*. MAP 5.

Although most often, following Small, identified as *Ruellia hybrida* Pursh, it can hardly be overlooked that *R. heteromorpha* is a species of southern Florida, most abundant in the subtropical Everglades and Keys regions, that its branches, as soon as developed, trail and greatly elongate, that the lower surfaces of its petioled leaves are glabrescent or nearly glabrous from the first (except for lineolate cystoliths and closely appressed strigae) while the upper surfaces are strigose, and that the tube of its fully expanded corolla is usually twice as long as the calyx-segments. *R. hybrida*, from Savannah, Georgia, was described as *erect and very much branched*, hirsute with white hairs; the *subsessile oblong leaves densely hirsute; the calyx-segments scarcely shorter than the corolla-tube*. That is not a good diagnosis of the present species. Furthermore, Savannah is about 180 miles (a significant distance) north of the northernmost known station for *R. heteromorpha;* and it is surely significant that Nees in DC. Prodr. xi. 123 (1847), indicating by a mark of affirmation that he had seen the Pursh material, cited as belonging with it Drummond's nos. 258 and 259, both of which belong in the essentially sessile- and oblong-leaved copiously white-villous-hirsute plant which Nuttall described from Arkansas as *R. humilis*, a species, moreover, which is unknown in eastern Georgia. Nevertheless, one can hardly pass by this identification by Nees, especially since the description of *R. hybrida* does not closely suggest *R. heteromorpha*. In view of his lack of material and his "lumping" of many different American plants as so-called varieties of his all-inclusive *Dipteracanthus ciliosus*, one can hardly accept the identification of Nees as final. Similarly, *R. ciliosa* Pursh, originally described as with subsessile, ovate-oblong leaves with margins and veins long-ciliate with white hairs, and also from Savannah, was by Nees, who evidently saw the original material, matched with the broader-leaved and longer-flowered extreme of the species which Nuttall described as *R. humilis*. Several of the numbers cited by Nees are before me. They are uniform and

have nothing to do except generically with *R. heteromorpha* nor with any plant known from the Savannah region; *R. parviflora*, as already sufficiently emphasized (see p. 2), was a misbegotten name for some plant (surely not the present) with "petioles 3–6 inches long"; while *R. caroliniensis* goes back to Walter's remarkably clear description of a plant extending hundreds of miles north of *R. heteromorpha*, with distinctive characters which do not belong to the latter: ovate-lanceolate and hirsute leaves; throat of corolla campanulate, etc. When many of the specimens were annotated by an earlier student as an unpublished new species, they were given a name previously used by Nuttall for a quite different species (with rosettes of spatulate leaves, the plant I take to be Pursh's *R. ciliosa*, the *R. humilis* sensu Small, not Nutt.), but identical material of the same numbers was likewise annotated with 2 or more additional names. Under these circumstances it seems wiser to avoid publishing names so vaguely understood by their author and to start anew.

In its vernal showily flowering state, with simple or subsimple, erect stems (PLATE 847, FIGS. 1–3) *Ruellia heteromorpha* is so unlike the later state of the plant (PLATE 848, FIGS. 1–3), with trailing and elongate heavily fruiting and freely branching stems, and with smaller or even closed and cleistogamous flowers, that the two might be mistaken for two species. Transitions between the two states are, however, very numerous.

7. R. CILIOSA Pursh. Rosulate copiously villous plant, either with main axis abbreviated (0.5–5 cm. long) or elongated to 3 dm. high, the internodes copiously white-villous, the pairs of leaves in the abbreviated plants crowded, in the more open and elongate individuals the 2–5 pairs remote, the stem often divergently branched, especially at base: lower subrosulate leaves oblong, oblong-obovate or oblong-oblanceolate to lance-spatulate, prolonged to subsessile bases, obtuse to rounded at summit, copiously lineolate and more or less villous-hirsute, the larger ones 2–10 cm. long and 1–3 cm. broad; the median leaves often much longer; the upper reduced and often crowded, both median and upper more definitely petioled, their margins often undulate: flowers mostly solitary in the axils, short-peduncled, the heavily villous peduncle terminated by 2 small oblong to lanceolate bracts: calyx-segments linear-acicular, copiously villous, 1.5–2.5 cm. long: corolla bluish or lavender to nearly white, 2.5–5.5 cm. long; the slender tube 1.3–3 cm. long, the slenderly obconic throat 5–10 mm. in diameter at summit, the expanded limb

2.5–5 cm. broad: capsule 1.3–2 cm. long, glabrous; retinacula 6 or 8: seeds suborbicular, about 3 mm. in diameter.—Fl. Am. Sept. ii. 420 (1814), not most later auth. *Dipteracanthus ciliosus* (Pursh) Nees in Linnaea, xvi. 204 (1842), not in DC. Prodr. xi. 122 (1847), which was a hopeless mixture. *R. humilis* sensu Small, Fl. Se. U. S. 1084 (1903), not Nutt.—Dry pine barrens and sands, South Carolina to central Florida and southeastern Louisiana. SOUTH CAROLINA: WITHOUT STATED LOCALITY: "Hab. in Carolina", *H. M. Altorp* (Mo). DARLINGTON CO.: sandy soil in Sheep Pasture Savannah at Hartsville, *B. E. Smith*, no. 1651 (NC), dwarf state, as *R. humilis;* sandy soil between Darlington and Hartsville, *B. E. Smith*, no. 916 (NC), tall state, as *R. hybrida* Pursh. SUMTER CO.: pine barrens near Cane Savannah, *Witmer Stone*, no. 426 (Phil), as *R. humilis*. GEORGIA: WITHOUT STATED LOCALITY: *Nuttall*, as an unpublished new species (Phil); *Boykin* (Phil). CAMDEN CO.: lowland, *Grace J. Schallert*, no. 13,127 (Schallert). CHARLTON CO.: "Extreme drought conditions", Gopher Ridge (sandy), near Sterling Branch, *Jean Sherwood Harper*, no. 419 (Phil), as *R. humilis*. WORTH CO.: vicinity of Poulan, *Pollard & Maxon*, no. 574, as *R. humilis*, later annotated (G) correctly as *R. ciliosa*. MITCHELL CO.: Camilla, *S. M. Tracy*, no. 3532 (Mo), as *R. strepens*. FLORIDA: DUVAL CO.: dry pine barrens, *A. H. Curtiss*, no. 1944*, as an unpublished var. of *R. strepens*, in some herbaria altered to *R. ciliosa*, in others to *R. humilis;* Jacksonville, 1875, *A. H. Curtiss* (US), correctly as *R. ciliosa*, annotated as *R. humilis;* dry pine barrens, *Fredholm*, no. 5085, as *R. ciliosa*, var. *longiflora* Gray. ST. JOHNS CO.: near St. Augustine, June, 1883, *T. F. Seal* (Phil). ORANGE CO.: sand, Winter Park, April, 1900, *A. M. Huger* (NY), as *R. humilis;* sandy pine barren, Lake Brantley, *C. S. Williamson* (NY), as *R. strepens*, altered to *R. humilis;* Clarcona, 1899, *A. J. Pieters*, no. 120 (US). LAKE CO.: Okahumpha, March 5, 1888, *Isaac Burk* (Phil); vicinity of Eustis, *Nash*, no. 183. HERNANDO CO.: dry sandy woods, Brookeville, *Moldenke*, no. 5948 (NY). PASCO CO.: high pineland, Blanton, *Barnhart*, no. 2653 (US), as *R. humilis*. HILLSBORO CO.: Tampa, June–Aug., 1898, *A. M. Ferguson* (Mo). MARION CO.: turkey-oak woods, east of Citra, April 14, 1940, *W. A. Murrill* (Mo), as *R. humilis*. ALACHUA CO.: Gainesville, *G. S. Miller*, no. 437 (US) as *R. humilis;* scrub west of Carroll's, near Gainesville, May 28, 1936, *W. A. Murrill* (Mo), as *R. humilis*. SUWANEE CO.: Live Oak, *S. M. Tracy*, no. 6684 (NY), as *R. humilis*. GADSDEN CO.: in pinetis, prope Quincy, Mai–Jul. 1843, *Rugel* (NY), as *R. strepens;* grassy, white sandy dry field under pine, River Junction, *Wiegand & Manning* no. 2927, as *R. humilis*. LIBERTY CO.: Bristol, *Chapman* (Mo, US). CALHOUN CO.: Wewahitchka, *Chapman* (Mo). HOLMES CO.: Ponce de Leon, June 20, 1905, *J. M. Mac-*

farlane (Pa). WALTON CO.: dry open woods, Crestview, *A. H. Curtiss*, no. 6489, in part, as *R. humilis*. OKALOOSA CO.: near Camp Pinchot, June 21, 1928, *O. M. Freeman* (USNA), as *R. humilis*. ALABAMA: WITHOUT STATED LOCALITY: *R. Haines*, from Gates (Phil). CHILTON CO.: Clauton, *Pollard & Maxon*, no. 273 (US), as *R. humilis*. ELMORE CO.: Deatsville, *Pollard & Maxon*, no. 305 (US), as *R. humilis*. WASHINGTON CO.: Fruitdale, July, 1904, *So. Floral Nursery Co.* (Mo), as *R. humilis*. BALDWIN CO.: dry woods, Magnolia Springs, June 25, 1909, *Schallert* (Duke); dry open woods, Point Clear, 1896, *Mohr* (US); dry pine barrens about ½ mile west of Elberta, *R. M. Harper*, no. 3795. MOBILE CO.: dry pine woods, Mobile, July, 1877, *Mohr* (US); pine barrens, Spring Hill, *E. W. Graves*, no. 498 (? or 948), in part only (Mo, US), as *R. humilis*. MISSISSIPPI: JASPER CO.: Heidelburg, *Tracy*, no. 3324 (US), as *R. humilis*. WAYNE CO.: Waynesboro, *Pollard*, no. 1221 (Mo, NY, US), as *R. humilis*. HARRISON CO.: Beauvoir, *S. M. Tracy*, no. 4942 (US), as *R. humilis;* Biloxi, *Tracy*, no. 6433 (US), as *R. parviflora*, altered to *R. humilis;* Ocean Springs, *A. B. Seymour*, no. 153, as *R. humilis*, var. *longiflora*. LOUISIANA: ORLEANS PARISH: New Orleans, *Drummond*. POINTE COUPÉE PARISH: dry sandy soil, Red River, *Hale*. PLATES 849 and 850; MAP 6.

Among the very diverse plants which have been identified with *Ruellia ciliosa* Pursh the present species seems to me most likely to be what he had from Savannah. His description, emphasizing the subsessile ovate-oblong leaves (remembering that Pursh used "ovate" for truly ovate and for *obovate* outlines) with long white ciliation, the bracts lanceolate, the subulate calyx-segments one fourth the length of the corolla-tube, was better for this plant than for most of the species (with ovate or lanceolate and petioled leaves) to which the name has been applied. Pursh's account was as follows

> *ciliosa*. 4. R. erecta, ramosa; foliis subsessilibus ovato-oblongis margine nervis venisque pilis albis longe ciliatis, bracteis lanceolatis brevibus, calycis laciniis subulatis tubo corollae quadruplo brevioribus.
> Near Savannah, Georgia. ♃. July. *v.s. in Herb. Enslen.*

Since this is the only plant which approximately satisfies the diagnosis and since it extends northward across South Carolina, I am retaining the name *Ruellia ciliosa* for it. When the actual type can be examined some revision may be necessitated. In DeCandolle, Prodr. xi. 122 (1847) Nees introduced a confusion

which has lasted for nearly a century, by citing under *Dipteracanthus ciliosus* a number of *Drummond* and other specimens, from Texas to Missouri, which belong to the wholly different *R. humilis* Nutt. The latter, of which a type or isotype is before me, is a definite and wide-ranging inland species, quite unknown on the Atlantic slope of South Carolina and Georgia, with essentially sessile, oblong, ovate or lanceolate leaves with none of the subspatulate or obovate tendency of *R. ciliosa* and never, so far as I have seen, with the slightest rosulate tendency. The type of *R. humilis* was from Arkansas. Nevertheless, Small, clearly describing as *R. humilis* only the dwarfer plants of *R. ciliosa*, gave it, as *R. humilis*, the range: "Georgia and Florida to Mississippi", thus excluding the type-region. By Small's account, his "*R. humilis*" had the "Stems very short, 1–3 cm. long". The majority of collections show some individuals with stems 0.3–3 dm. high, many of them from Florida; I cannot make out how Small disposed of them, for their leaf-outline and extreme villosity keep them out of his other categories.

(*To be continued*)

RUELLIA IN THE EASTERN UNITED STATES

M. L. Fernald

(*Continued from page 38*)

In northwestern Florida there occurs a localized variety which differs from wide-ranging *Ruellia ciliosa* in suppression of the pubescence, the internodes being merely cinereous-puberulent, and the calyx-segments, though long-ciliate, covered on the back with cinereous pulverulence. This should be called

Var. **cinerascens,** var. nov., caulis internodiis cinereo-puberulis; calycis laciniis dorso cinereo-pulverulentibus margine villoso-ciliatis.—NORTHWESTERN FLORIDA: WALTON CO.: dry open woods, Crestview, July 22, 1899, *A. H. Curtiss*, no. 6489 in part, distrib. as *R. humilis* (Mo, NY, US (TYPE in U. S. Nat. Herb.)). ESCAMBIA CO.: Fisherville, near Pensacola, June 17, 1905, *J. M. Macfarlane* (Pa).

8. R. SUCCULENTA Small. Erect or nearly so, with simple hollow and fleshy stems or erect branches 1.5–7.5 dm. high, the internodes sparingly puberulent or generally glabrous, purplish: leaves succulent, purplish, oblanceolate, narrowly obovate or oblong, narrowed to definite petioles, glabrous or minutely hirtellous and glabrate, undulate, the surfaces more or less lineolate; larger blades 3–6 cm. long and 0.7–2 cm. wide: flowers 1–3 on very short glabrous axillary peduncles: bracts small, lanceolate or oblong, glabrous: calyx-segments linear-filiform, 1–2 cm. long, glabrous or sparsely ciliate: corolla blue-purple, 2.5–4.5 cm. long, or the latest ones smaller; the slender tube 1.5–2.5 cm. long, the slenderly campanulate throat 0.7–1 cm. in diameter at summit, the expanded limb 2.5–4 cm. broad: capsule glabrous, rarely strigose, 1–1.5 cm. long, longer or slightly shorter than calyx.—Bull. N. Y. Bot. Gard. iii. 437 (1905).—Everglades region of southern FLORIDA: DESOTO CO.: sandhills, Avon Park to Sebring, *Small & DeWinkeler*, no. 9047 (NY). LEE CO.: hammocks, Myers, *Hitchcock*, no. 261. DADE CO.: border of wet prairie, Bay Biscayne, *A. H. Curtiss*, no. 5500E; near Cutler, *A. A. Eaton*, no. 257; in everglades near unfinished railroad grades, between Coconut Grove and Cutler, *Small & Carter*, no. 1721 (ISOTYPES); northwest of Perrine, *Small & Carter*, no. 2999; west of Perrine, *Small*, no. 7880; west of Peters, *Small*, nos. 7917 (NY) and 7923 (NC, NY, Pa); between Peter's Prairie and Homestead, *Small & Carter*, no. 2702 (NY); glade, Black Point Bridge, below Cutler, *J. P. Young*, no. 319 (US); hammocks, Black Point, *Small & Carter*, no. 1101 (NY); pinelands, Large Island, east of Naranja, *Small & Carter*, no. 3070 (NY); pinelands about Sykes Hammock, *Small, Mosier & Small*, no. 5659 (Duke, NY); hammocks on prairie east of Florida City, *Small*, no. 8080 (NY); near the Homestead Trail, *Small*, no. 2256 (NY); west of Camp Jackson, *Small & Wilson*, no. 1844 (NY); Camp Jackson to Camp Longview, *Small, Carter & Small*, no. 3490 (NY); Paradise Key and vicinity, *Safford & Mosier*, no. 207 (US). MONROE CO.: everglades, intersecting Long Key, *Small & Carter*, no. 3017 (NY). PLATE 851; MAP 7.

In its stiffly upright habit, glabrescent and more or less fistulous stems, fleshy purplish leaves and relatively short calyx *Ruellia succulenta* is not likely to be confused with more northern species.

Small contrasted it with *R. "parviflora"*, but that name, as currently used, applies to as diverse an aggregation of plants as can be imagined, the name, as originally applied, belonging to nothing readily identifiable. In some characters, especially in habit and foliage *R. succulenta* might, superficially, be mistaken for the next.

9. R. NOCTIFLORA (Nees) Gray. Stems erect or arched-ascending (rarely divergently branching from base—presumably after injury), 1.5–6 dm. high, cinereous-puberulent or minutely cinereous-pilose, glabrescent, with elongate internodes and 3–10 pairs of leaves on main axis: leaves narrowly lanceolate to lance- or elliptic-oblong, submembranaceous, puberulent or minutely hirtellous, tapering to blunt or subacute apex and to sessile to short-petioled base, undulate; the larger ones 3–8 cm. long and 0.8–2.7 cm. broad: peduncles solitary in axils of 1–4 upper pairs of leaves, very short, cinereous-puberulent; the 2 cinereous bracts linear-lanceolate and undulate-dentate: calyx-segments slenderly linear, cinereous-puberulent or minutely hirtellous, 2.5–4.5 cm. long: corolla bluish to nearly white, expanding in the night, 6–11 cm. long; slender tube 4.5–8 cm. long; the slender throat only 1–2 cm. long and 5–10 mm. thick; the expanded limb 3.5–6 cm. broad: capsule cinereous-puberulent, 2.25–3.5 cm. long.—Syn. Fl. N. Am. ii[1]. 326 (1878). *R. tubiflora* LeConte in Ann. Lyc. N. Y. i. 142 (1824), not HBK. (1817). *Dipteracanthus noctiflorus* Nees in DC. Prodr. xi. 123 (1847) in part, *i. e.* the typonym *Dizygandra tubiflora* Shuttleworth in Pl. Rugel in herb., and the citation of *R. tubiflora* LeConte and LeConte's material, not the other citations.—Savannas and wet pine barrens, evidently local, eastern Georgia to northwestern Florida, west to southwestern Louisiana. GEORGIA: WITHOUT STATED LOCALITY: *LeConte* (Mo, NY); savannas, *LeConte?* (Phil); these perhaps portions of the original collections, at first called *R. longiflora* (not *R. longiflora* Richard, 1792) but on some sheets altered to *R. tubiflora*, LeConte in his publication saying: "Inhabits in the savannahs of the Altamaha". RICHMOND CO.: "Altamaha, Bath", *LeConte* (Phil). LIBERTY CO.: near Sunbury[1], *LeConte* (NY); wet peaty pine barrens, 14 miles southeast of Ludowici, *Wiegand & Manning*, no. 2928 (erroneously noted as from "Long Co."). MCINTOSH CO.: at sea-level, about Darien Junction, June 25–27, 1895, *J. K. Small* (NY). FLORIDA: WITHOUT STATED LOCALITY: Florida, *LeConte* (Phil); Florida, *Chapman*, several collections (Mo, NY, Phil, US); West Florida, *Chapman*, several collections. WAKULLA CO.: "*Dizygandra noctiflora* Shuttl. n. sp.", In campis graminosis,

[1] Sunbury, not found on modern maps of Georgia, was thus described in Lippincott's Gazeteer (1856): "a decayed town of Liberty co., Georgia, on the Medway River, about 30 miles S. S. W. of Savannah".

inter St. Marks et Port Leon, Florida, legit *Rugel*, Jun. 1843 (Mo, NY), ISOTYPES of *Dipteracanthus noctiflorus* Nees. FRANKLIN CO.: Apalachicola, *Chapman*, with note, "The flowers open in the night and fall off by morning"; low prairie, Apalachicola, 1867, *B. F. Saurman;* low, grassy pine barren, Apalachicola, *Chapman*, distr. by Biltmore Herb., no. 4501[a]; low pinelands, Port St. Joe to Apalachicola, *Small, Small & DeWinkeler*, no. 11,417 (NY, US). ALABAMA: low meadows on the coast, Portersville, Sept., 1892, *Mohr* (US)—locality not definitely located, since Portersville in DeKalb County is not on the coast. CULLMAN CO.: Cullman, June 22, 1897, *Eggert* (Mo). MOBILE CO.: grassy pine meadows near the coast, Bayou Labatre, Aug. 13, 1892, *Mohr* (NY, US). MISSISSIPPI: Deer Island, *A. B. Seymour*, no. 197 (loosely branched, presumably injured, the rameal leaves with unusually long petioles). HARRISON CO.: Biloxi, June 22, 1899, *S. M. Tracy*, some specimens as no. 6500 others as no. 4948 (Mo, NC, NY, US). HANCOCK CO.: pine barren, *Woodson & Schery*, no. 51 (Mo); Bay St. Louis, *Ingalls* (NY). LOUISIANA: CALCASIEU PARISH: vicinity of Lake Charles, 1904, *Andrew Allison* (US). PLATES 852 and 853; MAP 8.

Ruellia noctiflora is one of the most distinctive and, at the same time, highly localized American species. In view of the great amount of collecting in the Southeastern States, it should, if at all common, be better represented in herbaria. LeConte's statement, when he originally published it as *R. tubiflora*, that it "Inhabits in the savannahs of the Altamaha", suggest localization. When he renamed the species *Dipteracanthus noctiflorus*, Nees, as usual, had very mixed ideas, for he included with the LeConte plant and that from St. Marks, Florida, material from Texas of the wholly different *R. humilis* Nutt.; in fact he made *R. humilis* a variety of *D. noctiflorus*, and he went so far in his general misinterpretations as to note that the wonderfully different *Dipteracanthus noctiflorus* "vix a D. cilioso Purshii differret". Aside from the minutely canescent pubescence which covers most parts of *R. noctiflora*, this species has the longest corolla and calyx of any of our species, and its very long (up to 3.5 cm. long) capsule is cinereous-puberulent.

10. R. HUMILIS Nutt. Stem often at first simple, soon with arched-ascending to horizontally divergent or reclining branches; the main axis 1–7 (–8.5) dm. high; the rather short internodes villous-hirsute or canescent-pilose to glabrescent, quadrate, with 4–12 pairs of leaves longer than the internodes, and 4–10 nodes floriferous: leaves coriaceous, often hirsute to villous on

nerves and margin, oblong or oblong-lanceolate to ovate, sessile or subsessile, nearly uniform or but slightly reduced upward: flowers few in the axils: bracts lanceolate, oblong or elliptic: calyx-segments 1.5–2.5 cm. long, linear-attenuate, mostly hirsute- to villous-ciliate: corolla 2–8 cm. long, lavender to bluish (rarely white), the slender tube 0.7–5 cm. long, the throat campanulate; corolla reduced, closed and tubular in rare cleistogamous individuals: capsule glabrous, 1.2–1.5 cm. long: seed suborbicular, 3–4 mm. in diameter.—A wide-ranging polymorphous species, of which the following are the more significant varieties.

a. Younger internodes of stem copiously villous-hirsute to canescent-pilose or -puberulent; larger leaves 3–8 cm. long, their veins and margins usually villous-ciliate....*b.*

b. Corolla 3–4.5 (–5) cm. long, its slender tube 1.2–2.5 cm. long.

Larger leaves of main axis elliptic-oblong to oblong-lanceolate, 1–2.5 cm. broad, obtuse to subacute. Internodes of stem copiously villous-hirsute with long divergent hairs.....10a. Var. *typica.*

Internodes canescent-pilose or -puberulent, with no or but few scattered long hairs.....10b. Var. *typica,* forma *grisea.*

Larger leaves of main axis ovate to oval-oblong or broadly elliptic, 2–4 cm. broad, mostly rounded at summit; stems strongly spreading-villous.....10c. Var. *frondosa.*

b. Corolla 5–8 cm. long, its slender tube 3–5 cm. long; internodes of stem more or less villous-hirsute.

Larger leaves of main axis elliptic-oblong to oblong-lanceolate, 1–2.5 cm. broad, obtuse to subacute. 10d. Var. *longiflora.*

Larger leaves of main axis ovate-oblong to broadly oval, rounded at summit, 2.5–4 cm. broad.....10e. Var. *expansa.*

a. Younger internodes of stem glabrous, glabrescent or with only few scattered hairs on the angles; leaves glabrous, glabrescent or only sparsely short-hirsute on nerves beneath and margin, narrowly elliptic-oblong to oblong-lanceolate, the larger ones 1–3 cm. broad and 2–6 cm. long; corolla 2–3.5 cm. long, its tube 0.7–2.3 cm. long; plant chiefly of Cumberland Plateau.....10f. Var. *calvescens.*

10a. Var. **typica.** *R. hirsuta* Ell. Sk. ii. 109 (1822), not Vell. (1790). *R. humilis* Nutt. in Trans. Am. Phil. Soc. v. 182 (1837). *Dipteracanthus noctiflorus,* β. *humilis* Nees in DC. Prodr. xi. 123 (1847), at least as to basonym. *R. ciliosa,* var. *longiflora* Gray, Syn. Fl. N. Am. ii[1]. 326 (1878) in part only. *R. ciliosa,* var. *humilis* (Nutt.) Britton in Trans. N. Y. Acad. Sci. ix. 185 (1890), at least as to basonym.—Dry prairies, rocky slopes, open woods, etc., southern and eastern Iowa to Texas, east to the Mississippi and very locally to south-central Pennsylvania, western Maryland, western Virginia, Tennessee and northwestern Alabama. The following are characteristic (all, unless specified, called *R. ciliosa* Pursh). PENNSYLVANIA: FRANKLIN CO.: "abundant and common", Chambersburg, July 24, 1896, *Thos. C. Porter*

(NY, Phil), variously as *R. ciliosa*, *R. ciliosa*, var. *parviflora* and *R. strepens*, var.; dry ground, among grasses, near Baker Cavern, south of Williamson, *Hans Wilkens*, no. 5592 (Pa); Mercersberg, 1846, *Ruel* (Phil), as *R. strepens*. MARYLAND: WASHINGTON CO.: Potomac River, Williamsport, Aug. 1849, *Porter* (Phil), as *Dipteracanthus strepens*. WEST VIRGINIA: HARDY CO.: Lost River, Aug. 18, 1931, *Core* (NY). VIRGINIA: GILES CO.: Ripplemead, Aug. 29, 1933, *Alexander, Everett & Pearson* (NY), as *R. parviflora;* roadside near Stone Quarry, above Ripplemead, July 19, 1936, *M. L. Vardell* (Pa); limestone cliffs, Ripplemead, August 11, 1937, *Lena Artz* (MtL). OHIO: CUYAHOGA CO.: near Blue Rock Springs, Cleveland, *Greenman*, no. 1542. INDIANA: ST. JOSEPH CO.: South Bend, Aug. 3, 1909, *Mrs. Joseph Clemens* (NY). WARREN CO.: dry, sunny poor soil, northwest of Covington, *R. M. Tryon, Jr.*, no. 2698 (Duke), as *R. caroliniensis*. FLOYD CO.: rocky woods between Duncan and New Albany, *Deam*, no. 13,995 (NY). CRAWFORD CO.: rocky, exposed wooded hillside southwest of Milltown, *Deam*, no. 16,422. KENTUCKY: LOGAN CO.: limestone ledges and barrens, near Russelville, *E. J. Palmer*, no. 17,758 (Mo), as *R. parviflora* (transition to var. *calvescens*). TENNESSEE: DAVIDSON CO.: copses, vicinity of Nashville, *Gattinger;* West Nashville, *Eggleston*, no. 5160. FRANKLIN CO.: Cumberland Mts., Cowan, *Ruth*, no. 564 (US). ALABAMA: FRANKLIN CO.: small flat cedar glade just north of Isbell, *R. M. Harper*, no. 3887 (US, VPI), as *R. caroliniensis* (transition to var. *calvescens*). MISSISSIPPI: LOWNDES CO.: sandy, open places, banks of Tombigbee River, Columbus, June 15, 1892, *C. Mohr* (US), as *R. ciliosa*, var. *hybrida*. WARREN CO.: near Vicksburg, *Paul J. Schallert, Jr.*, no. 13127 (*Schallert*). ILLINOIS: COOK CO.: limestone cliffs, Lemont, July 20, 1912, *E. L. Braun* (Braun). WILL CO.: near Romeo, Aug. 6, 1895, *Umbach* (US). KANKAKEE CO.: river-bank, vicinity of Kankakee, *C. C. Crampton*, no. 568 (US). RICHLAND CO.: southwest of Calhoun, *Robt. Ridgway*, no. 3183, in part (Phil). KENDALL CO.: Yorkville, September, 1884, *T. E. Boyce*. LEE CO.: Dixon, July, 1861, *Wm. Boott* (Phil), as *Dipteracanthus ciliosus*, correctly annotated as *R. humilis*. WASHINGTON CO.: Ashley, *F. Beckwith*, no. 47 (Mo). JACKSON CO.: gumbo soil, woods, Big Muddy River, *John McCree, Jr.*, no. 833 (Mo). UNION CO.: southwest of Lick Creek, Oct. 7, 1939, *E. Anderson & Wm. Bauer* (Mo). IOWA: CLINTON CO.: Lyons, *Pammel*, no. 77 (NY). HENRY CO.: Mt. Pleasant, *C. R. Ball*, no. 1564 (Mo), *J. H. Mills*, no. 1732 (Mo). DECATUR CO.: dry soil, Aug. 4, 1903, *J. P. Anderson* (Mo). MISSOURI: CLARK CO.: Aug. 27, 1892, with cleistogamous flowers (NY). MARION CO.: woods, Hannibal, *John Davis*, no. 978 (Mo). RALLS CO.: dry hillsides, west of Hannibal, *John Davis*, no. 4646 (Mo). PIKE CO.: Eolia, Aug. 26, 1916, *John Davis* (Mo). ST. LOUIS CO.: Meramec Highlands, July 29,

1905, *A. G. Johnson* (Mo); West Webster, *Uphof*, no. 3803 (Mo). JEFFERSON CO.: Cedar Hill, *John H. Kellogg*, no. 1185 (Mo). FRANKLIN CO.: Pacific, Sept. 18, 1910, *Moses Craig* (Mo). BUTLER CO.: woods, *Bush*, no. 3739 (Mo, NY, US), as *R. parviflora*. SHANNON CO.: *Bush*, no. 70, identification correctly altered to *R. humilis*. COOPER CO.: rocky woods, *Bush*, no. 15,137 (Mo). MORGAN CO.: rocky woods, *Bush*, no. 15,147 (Mo). WEBSTER CO.: upland limestone glade, north of Forkner's Hill, *Steyermark*, no. 23,854 (Mo), as *R. caroliniensis*. OZARK CO.: rocky open ground (dolomite), slopes of "Bald Jesse", near Gainesville, *E. J. Palmer*, no. 33,073 (Mo). BENTON CO.: Cole Camp, *Trelease*, no. 439 (Mo). BARRY CO.: barrens, *Bush*, no. 15,007 (Mo), as *R. parviflora*. CLAY CO.: Chandler, June 29, 1893, *A. C. Magruder* (Mo), as *R. ciliosa*, var. *humilis*. JACKSON CO.: rocky barrens, Greenwood, *Bush*, no. 9745 (Mo, NY), as *R. parviflora;* Rocky Bluff, south of Independence, *K. K. Mackenzie*, no. 1065 (NY), as *R. ciliosa*, var. *humilis*. JASPER CO.: chert barrens, Joplin, *E. J. Palmer*, no. 1309 (Mo) and no. 18,451 (NY), the latter as *R. parviflora*. NEWTON CO.: chert barrens, Reding's Mill, *E. J. Palmer*, no. 1532 (Mo). MCDONALD CO.: July 24, 1893, *Bush* (Mo). ARKANSAS: WITHOUT STATED LOCALITY: "on rocks in the upland forests and prairies", *Nuttall*, TYPE or ISOTYPE (NY), the specimen marked by Britton *R. ciliosa* Pursh. CLAY CO.: woods, Moark, *Bush*, no. 3746 (Mo), as *R. parviflora*. LONOKE CO.: fallow fields, Carlisle, *Demaree*, no. 17,613 (Mo), as *R. caroliniensis*. PULASKI CO.: rocky ridges, Fourche Mt., *Demaree*, no. 19,797 (Mo), as *R. caroliniensis*. CARROLL CO.: rocky slopes, Eureka Springs, *E. J. Palmer*, no. 4426 (Mo). BENTON CO.: Decatur, 1899, *E. N. Plank* (NY). JOHNSON CO.: ridges, Knoxville, *Demaree*, no. 19,933 (Mo), as *R. caroliniensis*. FRANKLIN CO.: low ridges, Branch, *Demaree*, no. 17,786 (NY), as *R. caroliniensis*. YELL CO.: dry rocky ridges, Tones Mt., Dardanelle, *Demaree*, no. 20,006 (Mo, NY). SCOTT CO.: dry low hills, Mansfield, *Demaree*, no. 18,171 (NY). LOUISIANA: CALCASIEU PARISH: Lake Charles, *S. M. Tracy*, no. 3468 (NY). KANSAS: CRAWFORD CO.: 6 miles west of Pittsburg, *Rydberg & Imler*, no. 164 (NY). LABETTE CO.: bluffs north of Oswego, *Rydberg & Imler*, no. 359 (NY). MONTGOMERY CO.: northeast of Caney, *Rydberg & Imler*, no. 401 (NY). OKLAHOMA: OTTAWA CO.: woods, Miami, *G. W. Stevens*, no. 2304. MCCURTAIN CO.: woods, near Idabel, *H. W. Houghton* as *G. W. Stevens*, no. 3633. OSAGE CO.: dry knoll, near Pawhuska, *G. W. Stevens*, no. 1931. PAYNE CO.: Stillwater, *Waugh*, no. 144 (Mo); sandy clay soil, north of Stillwater, *Robert Stratton*, no. 141 (Mo). ELLIS CO.: sand, Arnett, *L. F. Locke*, no. 25 (US). TEXAS: WOOD CO.: sands, Mineola, *Reverchon* (Mo). JEFFERSON CO.: west of Beaumont, April 11, 1921, *E. T. Wherry* (US), correctly identified. HARRIS CO.: prairies, Laporte, *Reverchon*, no. 3938

(Mo), as *R. parviflora.* BRAZOS CO.: College Station, *R. G. Reeves*, nos. 167 and 168 (US). DALLAS CO.: dry places, Dallas, July, 1877, *Reverchon* (NY). BELL CO.: dry woods, near Temple, *S. E. Wolff*, no. 2288 (US). TARRANT CO.: sandy post-oak woods between Grapevine and Ft. Worth, *Lundell & Lundell*, no. 9516 (US). FAYETTE CO.: Crawford, 1892 (Mo). LAVACA CO.: Hallettsville, *G. L. Fisher*, no. 100 (US). BEXAR CO.: bank of Helotes Creek, northwest of San Antonio, *Sister Mary Clare Metz*, no. 59 (NY). KERR CO.: hillside woods, Lacey's Ranch, *E. J. Palmer*, no. 9994 (Mo). PLATES 854 and 855; MAP 9.

The minor form with white corollas is

Forma **alba** (Steyermark), comb. nov. *R. caroliniensis*, forma *alba* Steyermark in RHODORA, xli. 585 (1939).—TYPE from MISSOURI: prairie-slopes above limestone bluffs along Long Creek, 1½ miles south of Kingston, Caldwell County, *Steyermark*, no. 3058 (ISOTYPE Mo).

Although the description of forma *alba*, as a form of *Ruellia caroliniensis* (a strikingly different species not found in Missouri), gave no indication that it is an albino of the sessile-leaved species of the prairie-region and not at all of *R. caroliniensis*, the isotype is quite like typical *R. humilis* except for its white corolla.

Forma **grisea,** f. nov. (TAB. 856) caulis internodiis griseo-puberulis vel cinereo-pilosis, vix hirsutis.—Scattered through the range of var. *typica.* OHIO: PICKAWAY CO.: Aug. 9, 1912, *R. R. Dreisbach* (Phil). ILLINOIS: JACKSON CO.: gravelly hillside, Grand Tower, Aug. 28, 1900, *Gleason*, no. 1803. MISSOURI: PHELPS CO.: Jerome, Oct. 5, 1913, *John H. Kellogg*, no. 157 (Mo). JACKSON CO.: dry open bank, Kansas City, Sept. 15, 1916, *Ralph Hoffmann* (Mo). MCDONALD CO.: dry ground, uncommon, July 24, 1893, *Bush*, no. 281 (TYPE in Herb. Gray.; ISOTYPE in Herb. Britt.). LOUISIANA: JEFFERSON DAVIS PARISH: knolls in low prairie, May 17, 1915, *E. J. Palmer*, no. 7649 (Mo). CALCASIEU PARISH: Lake Charles, Aug. 7, 1897, *S. M. Tracy*, no. 3469 (US). OKLAHOMA: OTTAWA CO.: pasture near Narcissa, Aug. 31, 1937, *F. R. Fosberg*, no. 14,289 (Penn). TEXAS: VAN ZANDT CO.: Grand Saline, Oct. 18, ——, *Reverchon* (Mo).

Var. **frondosa,** var. nov. (TAB. 857), internodiis valde villoso-hirsutis; axis primarii foliis majoribus ovatis vel ovali-oblongis vel late ellipticis, 3.5–8 cm. longis 2–4 cm. latis, plerumque obtusis; corollis 3–4.5 (–5) cm. longis tubo 1.2–3 cm. longo.—Southeastern Nebraska to eastern Texas and Louisiana, eastward to south-central Pennsylvania and western Virginia; specimens, unless otherwise noted, originally called *R. ciliosa*, in a few cases corrected to *R. humilis.* PENNSYLVANIA: FRANKLIN CO.: Chambersburg, Aug. 27, 1897, *Thos. C. Porter.* VIRGINIA:

SHENANDOAH CO.: rocky (limey) woods, near Strasburg, *Hunnewell*, no. 12,037 (FWH), as *R. caroliniensis;* limestone barrens near Strasburg, June 6, 1936, *Hunnewell* (VPI), as *R. caroliniensis;* damp thicket near Meadow Mills, *Hunnewell*, no. 17,837 (FWH). WYTHE CO.: banks, Reed Creek, June 28, 1910, *F. S. H.* (VPI). OHIO: CUYAHOGA CO.: Euclid Heights, Cleveland, *Greenman*, no. 353; near Blue Rock Springs, Cleveland, *Greenman*, nos. 1541 and 1542 (US). GREEN CO.: Xenia, July 10, 1883, *H. A. Young;* open bottoms, Yellow Springs, July 10, 1935, *Demaree*, no. 11,436 (Mo, Phil); Cedarville, July, 1906, *J. F. Clevenger* (US). MONTGOMERY CO.: Dayton, *John W. VanCleve* (Phil), as *R. oblongifolia.* CLERMONT CO.: sandy soil, gravel terrace, Mulford, June 17, 1916, *E. L. Braun* (Braun). HAMILTON CO.: gravel banks, near Fernald, July 19, 1914, *E. L. Braun* (Braun). INDIANA: WARREN CO.: prairie north of Tab, August 31, 1916, *Deam*, no. 21,613 (NY); high bank of Pine Creek, west of Kramer, July 8, 1918, *Deam*, no. 25,843. MARION CO.: abundant among tall weeds between Indianapolis and Carmel, Aug. 8, 1942, *R. C. Friesner*, no. 17,202 (TYPE in Herb. Gray.; ISOTYPE in Herb. Butler Univ.), distrib. as *R. caroliniensis;* same station, August 5, 1944, *Friesner*, no. 18,579 (topotypes). HARRISON CO.: bluff, south side of Buck Creek, southeast of Corydon, June 15, 1940, *Friesner*, no. 14,369 (Duke, NY), as *R. caroliniensis.* KENTUCKY: PENDLETON CO.: dry grassy bank, south of Peach Grove, July 8, 1941, *E. L. Braun*, no. 4037. TENNESSEE: DAVIDSON CO.: West Nashville, May 26–27, 1909, *Eggleston*, no. 4436 (Phil). ILLINOIS. COOK CO.: Chicago, *H. H. Babcock* (US); Flossmoor, Aug. 1, 1909, *Greenman*, no. 2816. DUPAGE CO.: introduced along roadside, Naperville, Aug. 1, 1897, *L. M. Umbach* (US). WILL CO.: roadside, Romeo, June 25, 1896 (Phil), July 26, 1897 (US), *Umbach.* WINNEBAGO CO.: Rockford, July 11, 1926, *Pammel & Fisk*, no. 293 (Mo). RICHLAND CO.: Larchmount, Aug. 1, 1914, *Robt. Ridgway.* CHAMPAIGN CO.: vicinity of Urbana, Aug. 10, 1910, *Steele* (US). STARK CO.: gravel slope, near Wady Petra, July 9, 1900, *V. H. Chase*, no. 673 (Phil). HANCOCK CO.: Augusta, 1845, *S. B. Mead*, as *R. strepens.* ST. CLAIR CO.: dry ground, June 28, 1875, *Henry Eggert* (Mo). IOWA: CLINTON CO.: Clinton (Lyons), Sept. 4, 1896, *Pammel*, no. 77. WARREN CO.: Indianola, July 6, 1918, *Pammel, Welbus & Jacques.* MISSOURI: CLARK CO.: Dumas, Aug. 27, 1892, *Bush* (Mo). ST. LOUIS CO.: collines arides, St. Louis, Juillet 1838, *Riehl* (Mo), as *R. strepens;* O'Fallon Park, St. Louis, June 28, 1892, *N. M. Glatfelter* (Mo). JEFFERSON CO.: Bushberg, July 4, 1883, *F. C. Prince.* ST. FRANCOIS CO.: dry ground, Bismark, Aug. 1897, *Colton Russell* (Mo). CARTER CO.: dry open ground, Van Buren, July 6, 1913, *E. J. Palmer*, no. 6205 (Mo). NODAWAY CO.: dry grassy openings, northwest of Parnell, June 20, 1938, *Steyermark*, no. 5936 (Mo). JACKSON CO.:

dry grounds, Waldo Park, June 10, 1896, *K. K. Mackenzie* (US). JOHNSON CO.: sandstone hillside, Warrenburg, Aug. 27, 1916, *G. W. Stevens*, no. 4106 (NY). GREENE CO.,: northeast of Springfield, Aug. 29, 1911, *P. C. Standley*, no. 8390 (US). JASPER CO.: chert barrens, northwest of Joplin, Aug. 16, 1908, *E. J. Palmer*, no. 1309 (Mo). MCDONALD CO.: dry open ground, Noel, Sept. 7, 1913, *E. J. Palmer*, no. 4164 (Mo); chert slopes west of Noel, May 31, 1938, *Steyermark*, no. 562 (Mo), as *R. caroliniensis*. ARKANSAS: FAULKNER CO.: rocky glade, Guy, Sept. 4, 1934, *Demaree*, no. 10,963 (US). PULASKI CO.: Little Rock, July, 1886, *H. E. Hasse* (NY). CARROLL CO.: Eureka Springs, July 17, 1898, *N. M. Glatfelter* (Mo). LOUISIANA: RAPIDES PARISH: pine woods, vicinity of Alexandria, June 6, 1899, *C. R. Ball*, no. 655, in part (Mo, US). NEBRASKA: LANCASTER CO.: roadsides, Lincoln, Aug. 1889, *H. J. Webber* (US). KANSAS: DOUGLAS CO.: Lawrence, *W. C. Stevens* (US). RILEY CO.: prairie, June 15, 1895, *J. B. Morton*, no. 386 (Mo). GEARY CO.: Republican Fork of Kansas River, June 25, 1856, *H. Engelmann* (Mo). CHEROKEE CO.: road through wooded area, southeast corner of county, July 23, 1937, *N. B. Jacobs*, no. 134 (NY). COWLEY CO.: 1895, *C. M. Gould* (NY). OKLAHOMA: ELLIS CO.: east of Harmon, June 17, 1932, *H. Wilkens* (Phil). TEXAS: VAN ZANDT CO.: sandy pasture 1 mile east of Martin's Mill, May 7, 1939, *Durward Timmons*, no. 522 (NY). TRAVIS CO.: Austin, *C. Wright*. MAP 10.

Var. **longiflora** (Gray), comb. nov. Stems villous-hirsute: leaves copiously villous-hirsute on veins and margins; the larger ones of the main axis elliptic-oblong to oblong-lanceolate, 1–2.5 cm. broad and 3–6 cm. long, obtuse to subacute: corolla 5–8 cm. long, its tube 3–5 cm. long.—*R. ciliosa*, var. *longiflora* Gray, Syn. Fl. N. Am. ii[1]. 326 (1878) as to descr., largely excl. synonyms. *Dipteracanthus Drummondii* Torr. & Gray ex Engelm. & Gray in Bost. Journ. Nat. Hist. v. 258 (1845), not *D. Drummondianus* Nees.—Southern Illinois, Missouri and eastern Kansas to Louisiana and Texas; specimens, unless noted, distributed as *R. ciliosa*, more rarely as *R. humilis*. ILLINOIS: RICHLAND CO.: Parkersburg, June 14, 1902, *Robt. Ridgway* (US). MACOUPIN CO.: Piasa, Aug. 5, 1905, *G. E. McClure* (Mo). WILLIAMSON CO.: dry soil, Bush, *John McCree, Jr.* no. 881 (Mo). MISSOURI: MARION CO.: dry soil, near Mark Twain Cave, *John Davis*, no. 4101 (Mo). LINCOLN CO.: Silex, *John Davis*, no. 3887 (Mo). ST. LOUIS CO.: Windsor Springs, July 1, 1890, *A. S. Hitchcock* (Mo). JEFFERSON CO.: stony hills north of Hematite, July 7, 1891, *Henry Eggert*, (Mo); dry limestone glade southwest of Crystal City, *Steyermark*, no. 1114 (Mo), as *R. caroliniensis;* Festus, July 11, 1925, *Woodson* (Mo); south of Festus, *Mildred Mathias*, no. 700 (Mo). WASHINGTON CO.: Potosi, July 24, 1885, *Frederick Wislizenus* (Mo). COOPER CO.: rocky barrens, *Bush*, no. 13,673 (Mo).

GREENE CO.: dry hills near Fulbright Spring, *P. C. Standley*, no. 9567 (US). TANEY CO.: Forsythe, *Trelease*, no. 440 (Mo), as *R. ciliosa*, var. *longiflora*. JACKSON CO.: rocky hillside, June 15, 1864, *G. C. Broadhead* (Mo). BENTON CO.: Mora, *Trelease*, no. 438 (Mo). ST. CLAIR CO.: rocky woods, Osceola, *Bush*, no. 12,819 (Mo). JASPER CO.: Aug. 16, 1893, *Bush* (Mo), as *R. ciliosa*, var. *longiflora*. ARKANSAS: CRAIGHEAD CO.: open woods, Lake City, *Demaree*, no. 3391 (Mo). SHARP CO.: Hardy, *Greenman*, no. 152[a] (Mo). ASHLEY CO.: prairie-thickets, Mist, *Demaree*, no. 15,096 (Mo). FAULKNER CO.: rocky hillsides, Guy, *Demaree*, no. 10,963 (NY). CONWAY CO.: Petit Jean Mt., Morrilton, June 25, 1937, *John K. Edwards* (Pa). LOGAN CO.: rocky, dry situations at 2800 ft., Magazine Mt., *Demaree*, no. 17,720 (Mo, NY), as *R. caroliniensis*. SEBASTIAN CO.: Fort Smith, 1853–4, *J. M. Bigelow* (US). LOUISIANA: WITHOUT CITED STATION: western Louisiana, *Hale*, TYPE of *R. ciliosa*, var. *longiflora* Gray, in Torrey Herb. (NY). NATCHITOCHES PARISH: dry open ground, Natchitoches, *E. J. Palmer*, no. 7940 (NY); dry sandy ground, Chopin, *E. J. Palmer*, no. 7565 (Mo); long-leaf pine sandhills, June 20, 1930, *Caroline Dorman* (NY). RAPIDES PARISH: Alexandria, *Josiah Hale* (NY). JEFFERSON DAVIS PARISH: knolls on low prairies, Welsh, *E. J. Palmer*, no. 7649 (NY). CALCASIEU PARISH: low grassy soil, 1 mile east of Lake Charles, *D. S. & H. B. Correll*, no. 9652. KANSAS: WITHOUT DEFINITE LOCALITY: between Neusha and Red Fork, Sept., 1849, *Marcy Exped.* RILEY CO: Manhattan, Sept. 29, 1884, *M. A. Carleton* (Mo). LYON CO.: Emporia, July 13, 1891, *E. C. Smith* (Mo). MONTGOMERY CO.: dry prairie, Cherryvale, September 16, 1900, *Frank W. Johnson* (NY). SEDGWICK CO.: Wichita, 1892, *H. R. Rose*. OKLAHOMA: CRAIG CO.: north of Vinita, *G. J. Goodman*, no. 3047. OSAGE CO.: dry knoll, Pawhuska, *G. W. Stevens*, no. 1931. CREEK CO.: Sapulpa, *Bush*, no. 428 (Mo). TEXAS: WITHOUT STATED LOCALITY: *Drummond*, nos. 219 and 220 (PARATYPES) and 258 (nos. 220 and 258 the types of *Dipteracanthus Drummondii* Torr. & Gray); *Lindheimer*, no. 158; *Reverchon*, no. 725 (Mo). TYLER CO.: pineland south of Woodville, *Lundell & Lundell*, no. 11,544 (US). HARDIN CO.: east of Camp Jackson, *Cory*, no. 19,793. HOUSTON CO.: sandy open ground, Latexo, *E. J. Palmer*, no. 12,820 (Mo, NY). WALKER CO.: vicinity of Huntsville, *R. A. Dixon*, no. 377. MONTGOMERY CO.: Willis, *L. R. Warner* (Mo). HARRIS CO.: open woods, June, 1842, *Lindheimer* (Mo); prairies, Houston, *Elihu Hall*, no. 425 (Mo, NY, US); low ground, Houston, *Biltmore Herb.*, no 4501[b] (US), as *R. noctiflora;* Laporte, *Reverchon*, no. 3938 (Mo, NY). FORT BEND CO.: Richmond, *W. L. Bray*, no. 96 (US). AUSTIN CO.: sandy loam of prairie, San Felipe, *F. W. Pennell*, no. 10,292 (NY). COLORADO CO.: dry sandy oak-land, Sheridan, *F. W. Pennell*, no. 5520 (Pa). DALLAS CO.: Dallas, June, 1874, *Reverchon*, no. 410, PARATYPE; vicinity

of Dallas, *Mary R. Stephenson*, no. 92 (US); creek-bottoms, north of White Rock Lake, *Lundell*, no. 11,676 (US); post-oak woodland, north of Seagoville, *Lundell*, no. 11,679 (US). TARRANT CO.: Fort Worth, *Ruth*, no. 103 (different sheets as no. 103, distributed as from dry woods, June 27, 1911 (NY), dry woods, August 10, 1912 (Mo), open woods, Oct. 2, 1912 (G) and from rocky ground, Aug. 10, 1924 (NY)). TRAVIS CO.: Austin, *Tharp*, no. 1384 (US). BASTROP CO.: McDade, *Va. Collins*, no. 266. DE WITT CO.: hillside, July 30, 1941, *Marguerite Riedel*. BEXAR CO.: hills north of San Antonio, Sept. 1, 1900, *Henry Eggert* (Mo). TOM GREEN CO.: Knickerbocker Ranch, Dove Creek, May, 1880, *Frank Tweedy* (US), as *R. ciliosa*, var. *longiflora*. PLATE 858; MAP 11.

Var. **expansa,** var. nov. (TAB. 859), caulibus ad 8.5 dm. altis, internodiis valde villoso-hirsutis; axis primarii foliis majoribus ovatis vel ovali-oblongis vel late ellipticis apice obtusis, 2.5–4 cm. latis 3–7.5 cm. longis, ciliato-hirsutis; corollis 5–8 cm. longis, tubo 3–5 cm. longo.—Iowa and Nebraska to Texas, eastward to southern Michigan, western Indiana, Illinois, Missouri, and very locally to northeastern Mississippi and northwestern Florida; specimens, unless specially noted, originally distributed as *R. ciliosa*, more rarely as *R. humilis*. FLORIDA: CALHOUN CO.: Dead Lakes, *Chapman* (Mo). MICHIGAN: old specimen marked by Asa Gray "Michigan coll.". WISCONSIN: ROCK CO.: Beloit, 1860, *T. J. Hale* (Phil). INDIANA: TIPPECANOE CO.: dry sandy soil, Lafayette, July 4, 1898 (USNA), as *R. ciliosa*. MONTGOMERY CO.: roadside near Clarkshill, Aug. 12, 1934, *Scott McCoy*, no. 2010 (US). ILLINOIS: COOK CO.: Chicago, July 7, 1873, *H. H. Babcock* (US); prairie, Streator, Aug. 11, 1929, *Howard K. Henry*, no. 130 (Pa); between the Sag and Palos Park, Sept. 1, 1908, *Caldwell & Greenman*, no. 3584 (Mo); Riverside, June 29, 1871, *H. H. Babcock* (NY), July, 1888, *E. L. Sturtevant* (Mo). WILL CO.: Joliet, July 4, 1900, *H. P. Skeels* (USNA). WINNEBAGO CO.: Fountaindale, *M. S. Bebb*, as *Dipteracanthus strepens*. WOODFORD CO.: Minonk, Aug. 13, 1895, *Chas. Thom* (USNA). PEORIA CO.: Peoria, 1868, *J. T. Stewart* (Phil); dry barrens, Peoria, June, 1887, *F. E. McDonald;* dry prairies, Peoria, July, 1903, and July, 1904, *F. E. McDonald*. MASON CO.: Havana, Aug. 17, 1904, *Gleason*. HENDERSON CO.: oak barrens, near Oquawka, July 6 and August 20, 1872, *H. N. Patterson*. MCLEAN CO.: Bloomington, Aug. 1886, *E. C. Smith* (Mo). CHAMPAIGN CO.: Champaign, June 15, 1899, *Gleason*, no. 590; prairie, Urbana, July 15, 1878, *A. B. Seymour* (Duke). MACON CO.: openings in timber, Stevens Creek at Wabash, July 1, 1915, *I. W. Clokey*, no. 2429 (TYPE in Herb. Gray; ISOTYPES in Herb. Mo. Bot. Gard., N. Y. Bot. Gard. and U. S. Nat. Herb.); Decatur, July 14, 1940, *R. G. Mills* (NY). HANCOCK CO.: Augusta, 1843, *S. B. Mead* as *R. strepens?*. ADAMS CO.: Camp Point, Aug. 6,

1877, *A. B. Seymour* (Duke). ST. CLAIR CO.: woods, Belleville, July, 1846, *Th. Hilgard, Jr.* (Mo)—plant 8.25 m. high. RANDOLPH CO.: Red Bud, June 30, 1888, *L. H. Pammel* (Mo). MISSISSIPPI: OKTIBBEHA CO.: Agency, May 31, 1897, *S. M. Tracy*, no. 3203 (NY). IOWA: JOHNSON CO.: Aug. 13, 1909, *M. P. Somes*, no. 3617 (US). VAN BUREN CO.: open woods, Bentonport, July, 1920, *E. W. Graves*, nos. 1687 and 1957 (Mo). WAYNE CO.: July, 1885, *R. R. B.* (Phil). GREENE CO.: Jefferson, July 24, 1867, *J. A. Allen*. MADISON CO.: Peru, June 20, 1897, *D. E. Hollingsworth*, no. 577. RINGGOLD CO: Mount Ayr, July 24, 1926, *Ada Hayden* (Phil). FREMONT CO.: rich soil, border of woods, Manti, July 12, 1925, *L. H. Pammel*, no. 733. MISSOURI: MARION CO.: dry woods, Hannibal, Aug. 7, 1912, *John Davis* (Mo). PIKE CO.: dry meadow, near Clarkesville, June 15, 1914, *John Davis*, no. 2677 (Mo). ST. LOUIS CO.: limestone hill, Pacific, June 3, 1918, *J. R. Churchill* (Mo). WASHINGTON CO.: Irondale, June 30, 1893, *Henry Eggert*. CARTER CO.: rocky open ground, Van Buren, July 6, 1914, *E. J. Palmer*, no. 6205. PHELPS CO.: Jerome, June 16, 1914, *John H. Kellogg* (Mo). BOONE CO.: banks of Missouri River, Rocheport, July 4, 1927, *H. W. Rickett* (Duke). WRIGHT CO.: open woods, east of Mansfield, June, 1911, *O. E. Lansing*, no. 3180. MORGAN CO.: rocky woods, June 11, 1934, *Bush*, no. 13,708 (Mo, Pa). HICKORY CO.: cherty limestone slopes, east of Jordan, July 10, 1934, *Steyermark*, no. 13,216 (Mo). GREENE CO.: Springfield, July, 1904, *P. C. Standley* (US). JACKSON CO.: Independence, June 10, 1894, *Bush*, no. 349; barrens, Independence, July 6, 1900, *Bush*, no. 775 (Mo, US) and several other nos. (one of them with the penciled memorandum, "type of *R. ciliosa*", a difficult proposition to defend since Pursh's species was from Savannah, Georgia!). BARRY CO.: fields, Eagle Rock, June 29, 1897, *Bush*, no. 506 (Mo). JASPER CO.: dry prairies, Carthage, July 13, 1902, *Bush*, no. 356 (Mo). MCDONALD CO.: dry ground, *Bush*, no. 282 (NY), as *R. ciliosa*, var. *longiflora*. ARKANSAS: WITHOUT STATED LOCALITY: *Krunholdt*, no. 24. PRAIRIE CO.: Hazen, Grand Prairie, June 29, 1941, *Demaree*, no. 23,304 (Mo), as *R. caroliniensis*. CARROLL CO.: Eureka Springs, July 7, 1898, *N. M. Glatfelter* (Mo). BENTON CO.: prairie-like thickets, Willow Springs, Aug. 9, 1941, *Demaree*, no. 22,380 (Mo), as *R. caroliniensis*. LOUISIANA: RED RIVER PARISH: *J. Hale* as *R. hirsuta* Ell. NATCHITOCHES PARISH: dry open ground, Natchitoches, June 10, 1913, *E. J. Palmer*, no. 7946, in part (Mo). RAPIDES PARISH: Alexandria, 1844, *Josiah Hale* (NY, Phil, US). NEBRASKA: LANCASTER CO.: Lincoln, *H. J. Webber* (Mo). KANSAS: RILEY CO.: prairie, June 15, 1895, *J. B. Norton*, no. 386; Manhattan, 1883, *T. Bassler* (NY), June 5, 1887, *W. A. Kellerman* (Mo). BUTLER CO.: July, 1904, *S. C. Jones* (Mo). ROOKS CO.: Rockport, July 5, 1892 (US).

ELLIS CO.: *Cyril Zeller* (Mo). OKLAHOMA: OTTAWA CO.: pasture near Narcissa, Aug. 31, 1937, *F. R. Fosberg*, no. 14,289 (Pa). PITTSBURG CO.: rocky woods west of McAlester, May 27, 1920, *F. W. Pennell*, no. 10,600 (Phil). PAYNE CO.: Stillwater, June 22, 1926, *Robt. Stratton*, no. 622 (Mo); clay soil north of Stillwater, June 6, 1937, *Darrell McLean*, no. 3 (Phil). BRYAN CO.: Colbert, June 15, 1891, *C. S. Sheldon*, no. 14 (US), as *R. ciliosa*, var. *longiflora*. CLEVELAND CO.: Norman, Sept. 25, 1914, *W. H. Emig*, no. 522 (Mo), as *R. parviflora*. CADDO CO.: between Fort Cobb and Fort Arbuckle, 1868, *Edw. Palmer* (US), as *Dipteracanthus strepens*. COMANCHE CO.: Fort Sill, May 29, 1916, *Mrs. Joseph Clemens*. TEXAS: NEWTON CO.: Autreville, 1857, *C. G. Fosberg* (Phil). CAMP CO.: Pittsburg, Sept. 13, 1923, *Tharp* (Phil). GREGG CO.: July, 1939, *C. L. York*. WOOD CO.: post-oak woods, July 6, 1924, *Tharp* (US). HARRIS CO.: barren bluffs, Houston, Sept., 1843, *Engelmann* (Mo). DALLAS CO.: vicinity of Dallas, July 3, 1929, *Mary R. Stephenson*, no. 96 (US). PARKER CO.: Weatherford, July 4, 1902, *S. M. Tracy*, no. 8078. TRAVIS CO.: Austin, July 20, 1940, *Tharp* (transition to var. *longiflora*). NUECES CO.: near Corpus Christi, March, 1894, *A. A. Heller* (NY). COMANCHE CO.: DeLeon, June 16, 1941, *Tharp*. MAP 12.

Var. **calvescens,** var. nov. (TAB. 860), caulibus 1–4 dm. altis, ramosis, ramis plerumque divergentibus, internodiis glabris vel glabrescentibus vel sparse breviterque hispidis; foliis glabris vel glabrescentibus vel ad venas remote hirtellis, anguste elliptico-oblongis vel oblongo-lanceolatis, majoribus 2–6 cm. longis 0.7–2.3 cm. latis; corollis 2–3.5 cm. longis, tubo 0.7–2.3 cm. longo.—Cumberland Plateau of Kentucky and Tennessee, overlapping slightly into southern Indiana and southern Ohio, locally in Alleghenies of northwestern Virginia, Great Smoky Mountains of eastern Tennessee and mountains of northern Georgia and Alabama; specimens, unless otherwise noted, distributed as *R. ciliosa* or *R. humilis*. VIRGINIA: FREDERICK CO.: lime barrens, Middletown, Sept. 14, 1941, *Hunnewell*, no. 17,361, as *Dyschoriste oblongifolia* (misidentification mine). SHENANDOAH CO.: dry limerock barrens, 1 mile northeast of Strasburg, Aug. 30, 1927, *Wiegand & Manning*, no. 2934; rocky field near Ormanda, July 27, 1942, *Hunnewell*, no. 17,721 (FWH), as *Dyschoriste oblongifolia*. GEORGIA: WALKER CO.: Chickamauga Park, *Biltmore Herb.*, no. 849[b] (US). OHIO: HIGHLAND CO.: Sept., 1928, *Katie M. Roads*, September, 1928 (US). INDIANA: CRAWFORD CO.: in shallow soil on washed limestone slope, just north of Leavenworth, Oct. 5, 1920, *Deam*, no. 33,429 (Pa). KENTUCKY: WITHOUT STATED LOCALITY: 1916, *Anna King*, no. 310 (Duke and, in part, US); hills of Kentucky River, Aug. 15, 1895, *H. Garman & J. N. Rose* (TYPE in Herb. Gray; ISOTYPE in U. S. Nat. Herb.), distrib. as *R. strepens*. FLEMING CO.: dry soil

east of Hillsboro, Aug. 21, 1940, *E. L. Braun*, no. 3364 (Braun). ROBERTSON CO.: dry slopes, limestone soil, west of Blue Licks, July 8, 1941, *E. L. Braun*, no. 4044. NICHOLAS CO.: open woods, Blue Lick Springs, Sept. 17, 1936, *F. J. Scully*, no. 814 (US), as *R. parviflora;* dry soil, open red cedar, south of Fairview, Sept. 22, 1939, *E. L. Braun*, no. 2684 (Braun). SCOTT CO.: dry woods, Stamping Ground, July 27, 1931, *J. W. Singer*, no. 145 (US), as *R. parviflora.* PULASKI CO.: bluffs near Burnside, Aug. 22, 1903, *Biltmore Herb.* no. 849[k] (US). NELSON CO.: prairie patches, Balltown, July 22, 1940, *E. L. Braun*, no. 3248 (Braun); dry limestone slope, prairie patches, west of Bardstown, Aug. 18, 1941, *E. L. Braun*, no. 4085. HARDIN CO.: thin soil over limestone, Howe Valley, Sept. 6, 1927, *Wherry & Pennell*, no. 73,642 (Phil). HART CO:. sandy roadside, 2 miles southeast of Horse Cave, Sept. 4, 1930, *Svenson*, no. 4418. GRAYSON CO.: Leitchfield, Aug. 22, 1895, *J. N. Rose* (US), as *R. strepens;* Leitchfield, Oct. 11 and 12, 1903, *W. W. Eggleston*, no. 5442 (NY). EDMONSON CO.: prairie patches, dry limestone slopes, Mammoth Cave, Aug. 19, 1941, *E. L. Braun*, no. 4095 (branching unusually strict). WARREN CO.: near Bowling Green, Aug. 17, 1897, *Henry Eggert* (Mo); field, Bowling Green, Aug. 20, 1899, *Sadie F. Price* (Mo). TENNESSEE: SEVIER CO.: between Gatlinburg and Maryville, July 27, 1936, *W. C. Coker* (NC). WILSON CO.: dry cedar glades, Lebanon, Aug. 11, 1900, *Biltmore Herb.* no. 849[g] (US). DAVIDSON CO.: cedar barrens, common, *Gattinger* (Mo); Nashville, Aug., 1879, *Gattinger* (Mo); West Nashville, May 26–27, 1909. *Eggleston*, no. 4436 (US), Sept. 24–25, 1909, *Eggleston*, no. 5160 (NY, Phil). COFFEE CO.: near Manchester, Aug. 14, 1899, *Biltmore Herb.*, no. 849[b] (US). RUTHERFORD CO.: near Lavergne, Aug., 1897, *Henry Eggert* (Mo). FRANKLIN CO.: Cumberland Mts., Cowan, July, 1898, *Ruth*, no. 556 (NY), no. 590 (Mo). ALABAMA: MADISON CO.: ad montes, prope Huntsville, Oct., 1843, *Rugel* (NY), with unpublished but quite appropriate varietal name. MAP 13.

When sorted out from the very diverse species with which it has been confused, *Ruellia ciliosa*, *R. caroliniensis*, and even the wholly different *R. strepens* and the apocryphal *R. parviflora*, *Ruellia humilis* becomes a very consistent species of wide inland range. By the singular and not very edifying fatality which has obscured the clarification of even the simpler of our species of *Ruellia* the great bulk of material of the continental *R. humilis* (including its varieties) has very generally passed as *R. ciliosa* Pursh, its type from Savannah, Georgia, although there is no evidence in any of the larger American herbaria that the present species approaches Savannah nearer than the Shenandoah Valley

of Virginia, the Great Smoky Mountains of Tennessee, the mountains of northwestern Georgia, and the northwestern corner of Florida. Conversely, although *R. humilis* was described from "rocks in the upland forests and prairies" of Arkansas, the name *R. humilis* has been consistently used by Small and his followers for true and strikingly different *R. ciliosa* Pursh and given a range, "Sandy soil, Coastal Plain, Fla. to Miss. and Ga.", through a country without the dry limestone rocks where true *R. humilis* prevails, and entirely excluding the type-region of the latter!

There is great probability that *Ruellia hirsuta* Ell. Sk. ii. 109 (1822) was typical *R. humilis* Nutt. Elliott, familiar with the more eastern plants, went beyond the stated limits of his Sketch to describe a remarkable new species from "near the Alabama River in dry soils": "Hirsute, branching, leaves oval-lanceolate, nearly acute, sessile, segments of the calyx subulate, hispid, a little longer than the tube of the corolla . . . *Stem* . . . very hirsute. *Leaves* . . . almost hispid". Elliott's type is lost; furthermore his name was antedated by *R. hirsuta* Velloso (1790).

As the TYPE or ISOTYPE of *Ruellia humilis* (until a possibly more authentic type is found) I have taken an Arkansas specimen from Nuttall, in the Torrey Herbarium. This (PLATE 854, FIG. 1) is of the relatively short-flowered series with narrow leaves, a plant (MAP 9) prevailing west of the Mississippi, southward into Texas, but scattered eastward even to the mountains of south-central Pennsylvania, western Maryland and western Virginia. This plant passes through obvious transitions into a coarser and broader-leaved extreme of similar range (MAP 10), which might perhaps be considered an ecological variety were it not that in their morphological characters they exactly parallel the two plants with greatly prolonged corolla-tube (the longest corolla of any of our species except the southeastern Coastal Plain *R. noctiflora*). Although the very long-flowered plants have similar areas of development, the narrow-leaved var. *longiflora* (MAP 11) is more restricted, its eastern range stopping essentially at the Mississippi, with northern limits in southern Illinois and Missouri; the broader-leaved var. *expansa* (MAP 12) with outposts eastward to northwestern Florida, northeastern Alabama and in Indiana and Wisconsin and, farther west,

extending well into Iowa. These two plants, although merging, seem fairly well defined. In Texas and Louisiana var. *longiflora* has often been mistaken for the more eastern Coastal Plain *R. noctiflora*. It is promptly distinguished, however, by its greatly developed villous-hirsute pubescence, *R. noctiflora* being puberulent; by its short and strongly hirsute-ciliate calyx-segments, those of *R. noctiflora* prolonged (2.5–4.5 cm. long) and puberulent; and by its short and glabrous capsule, the very long (2.25–3.5 cm. long) capsule of *R. noctiflora* pubescent.

As extreme as any variation of *Ruellia humilis* is var. *calvescens* (MAP 13), concentrated on the Cumberland Plateau, with colonies along the Alleghenies and the Great Smokies. Smaller in all parts than most members of the species and nearly glabrous, it has been mistaken (by the writer among others) for *Dyschoriste oblongifolia* (Michx.) Ktze. In their more upright extremes the two plants are often superficially similar, but the technical differences of calyx-segments and anthers hold. Furthermore, when the ripe seeds of *R. humilis*, var. *calvescens*, like those of all our species of *Ruellia*, are moistened they promptly exude mucilage which soon takes the form of prolonging and streaming spiracles which finally give the seed a more or less plush-like surface. Many tests of seeds of *Dyschoriste oblongifolia* have shown no such mucilage-spiracles there. The latter species, furthermore, is a plant of southern Coastal-Plain pine barrens and fall-line sands, northward to South Carolina (the old and doubted basis for it as Virginian, in the Gray Herbarium, being a specimen with copied—not original—label, reading "Southern States. Virginia"), not of calcareous upland.

(To be continued)

elongate floriferous ascending basal branches; median leaves oblong, oblong-lanceolate, ovate or elliptic, subequal, subcoriaceous, often undulate-dentate.....11l. Var. *dentata*.

11a. Var. **typica.** Stem when well developed 1.5–7 dm. high, simple, or with divergently to horizontally spreading elongate branches mostly flowering at tips, obtusely angled, canescent-pilose to copiously white-villous; middle and lower internodes greatly elongated (5–18 cm. long), the uppermost greatly abbreviated: principal leaves elliptic, subrhombic, oval, ovate or ovate-lanceolate, membranaceous, slender-petioled, obtuse to acute, white-villous to villous-hirsute or canescent-pilose beneath when young, closely strigose above; the blades 3–10 cm. long and 1.5–4 cm. broad, with somewhat undulate surface, thus crumpled or puckered in drying: glomerules very short-peduncled, from 1–3 approximate or subapproximate upper nodes and at tips of longer branches, 2–many-flowered: bracts oblong-lanceolate to narrowly elliptic, nearly equaling to shorter than calyx: calyx-segments linear-setaceous, white-villous or canescent-pilose on back, villous-ciliate, 1.3–2.3 cm. long, usually considerably shorter than corolla-tube: corolla bluish-lavender, 2.5–5 cm. long; the slender tube 1.3–2.7 cm. long, the campanulate-obconic throat 1–1.5 cm. thick at summit; expanded limb 2.5–3.5 cm. broad: capsule often densely pilose-hirtellous, sometimes glabrous, 1.4–1.7 cm. long.—*R. strepens, capitulis comosis* Dillenius, Hort. Elth. ii. 330, t. 331 (1732). *R. strepens* L. Sp. Pl. 634 (1753), in part, not L. Mantiss. Alt. 422 (1771). *Anonymos caroliniensis* Walt. Fl. Carol. 168 (1788). *Pattersonia caroliniensis* (Walt.) J. F. Gmel. Syst. 925 (1791), the binomial wrongly ascribed to Walter, p. 167 (instead of 168) with a brief summary of Walter's generic diagnosis. *R. hybrida* Pursh, Fl. Am. Sept. ii, 420 (1814); LeConte in Ann. Lyc. N. Y. i. 140 (1824), in part only; Small, Fl. Se. U. S. 1084 (1903) and Man. 1229 (1933). *R. strepens* sensu Ell. Sk. ii. 109 (1822), not L. emend. *R. caroliniensis* (Walt.) Steud. (as *carolinensis*), Nom. ed. 2, ii. 481 (1841), based only on "*Patersonia carolinensis* Walt.", without further reference, this obviously copied (with change of spelling of both names) directly from J. F. Gmelin; Blake in Rhodora, xxii. 134 (1915), in part, excluding *R. ciliosa* and *R. carol.* var. *parviflora* (Nees) Blake and all synonyms cited under it. *Dipteracanthus strepens*, γ. *Dillenii* Nees in DC. Prodr. xi. 122 (1847), at least as to Dillenian plant. *D. ciliosus*, β. *hybridus* (Pursh) Nees l. c. 123 (1847), in part. *D. Mitchillianus* Nees l. c. (1847). *R. ciliosa*, var. *hybrida* (Pursh) Gray, Syn. Fl. ii¹. 326 (1878), in part.—Sandy woods, Florida, north to eastern South Carolina; Tennessee, Kentucky and eastern Arkansas (unless otherwise noted, specimens distributed as *R. hybrida*). South Carolina: lancaster co.: rocky hillside, 40-

a. Stem simple or with few ascending to suberect (very rarely strongly divergent) branches, spreading-hirsute, pilose, puberulent or glabrescent, the branches when borne from the middle and upper axils rarely prolonged or floriferous; leaves flat (not crumpled when carefully pressed), lanceolate to ovate, oval, elliptic or oblong, membranaceous and flexible to thickish, hard and firm, strigose to hispid along principal veins or quite glabrous beneath, remotely strigose to glabrescent above; corolla 2–4.5 cm. long; capsule usually glabrous. . . . *c.*

c. Leaves of upper more or less approximate nodes chiefly longer than those below, entire or not very dentate; 1 or 2 (rarely 3 or 4) nodes of the main axis floriferous, the lowest floriferous ones from closely crowded to 10 (–15) cm. apart; stem simple, only rarely branched. . . . *d.*

d. Longer leaves of the uppermost nodes broadly lanceolate to oval, ovate or elliptic, if lance-subacuminate 1.5–4.5 cm. broad; calyx-segments glabrous or nearly so on back; summit of throat of corolla 0.7–1.5 cm. broad, expanded limb 2.5–4 cm. broad. . . . *e.*

e. Leaves membranaceous, pliable, oval, ovate or elliptic to broadly lanceolate. . . . *f.*

f. Stem stoutish to slender, 1–5 mm. thick at base, 1–9 dm. high; larger leaves 5–12 cm. long, if obtuse mostly more than 7 cm. long. . . . *g.*

g. Leaves strigose or hispid on veins beneath; calyx-segments ciliate.

Internodes of stem (or some of them) copiously spreading-hirsute. . . . . 11d. Var. *membranacea.*

Internodes puberulent to glabrescent, at most with remote elongate trichomes 11e. Var. *membr.*, forma *breviberbis.*

g. Leaves glabrous beneath.

Calyx-segments ciliate; internodes of stem usually pubescent; upper surfaces of leaves usually strigose. . . . . 11f. Var. *membr.*, forma *hypopsila.*

Calyx-segments eciliate; internodes glabrescent or glabrous; upper surfaces of leaves glabrous or essentially so. . . . . 11g. Var. *membr.*, forma *laevior.*

f. Stem filiform, 1–2 mm. thick at base, 1–2 (–4) dm. high; leaves membranaceous, elliptic to oblong, the larger ones 2–6 cm. long, obtuse to rounded at apex.

Calyx-segments ciliate; internodes (or some of them) of stem copiously villous-hirsute with divergent hairs. . . . . 11h. Var. *nanella.*

Calyx-segments eciliate; internodes glabrescent or merely puberulent. . . . . 11i. Var. *nan.*, forma *eciliata.*

e. Leaves subcoriaceous, firm and stiff, lanceolate to lance-ovate, subacuminate; stem rigid, 4.5–9 dm. high. . . . . 11j. Var. *cheloniformis.*

d. Longer leaves of the uppermost nodes narrowly lanceolate to lance-linear, 0.5–1.5 (–2) cm. broad; stem slender, 1.5–7 dm. high; calyx-segments canescent-pilose to glabrescent; throat of corolla 5–10 mm. broad at summit, expanded limb 2–3.5 cm. broad. . . . . 11k. Var. *salicina.*

c. Leaves of flowering summit gradually much reduced in size; 4–9 nodes of well developed main axis bearing glomerules; all but upper internodes elongate; stem frequently with

elongate floriferous ascending basal branches; median leaves oblong, oblong-lanceolate, ovate or elliptic, subequal, subcoriaceous, often undulate-dentate.....11l. Var. *dentata*.

11a. Var. **typica.** Stem when well developed 1.5–7 dm. high, simple, or with divergently to horizontally spreading elongate branches mostly flowering at tips, obtusely angled, canescent-pilose to copiously white-villous; middle and lower internodes greatly elongated (5–18 cm. long), the uppermost greatly abbreviated: principal leaves elliptic, subrhombic, oval, ovate or ovate-lanceolate, membranaceous, slender-petioled, obtuse to acute, white-villous to villous-hirsute or canescent-pilose beneath when young, closely strigose above; the blades 3–10 cm. long and 1.5–4 cm. broad, with somewhat undulate surface, thus crumpled or puckered in drying: glomerules very short-peduncled, from 1–3 approximate or subapproximate upper nodes and at tips of longer branches, 2–many-flowered: bracts oblong-lanceolate to narrowly elliptic, nearly equaling to shorter than calyx: calyx-segments linear-setaceous, white-villous or canescent-pilose on back, villous-ciliate, 1.3–2.3 cm. long, usually considerably shorter than corolla-tube: corolla bluish-lavender, 2.5–5 cm. long; the slender tube 1.3–2.7 cm. long, the campanulate-obconic throat 1–1.5 cm. thick at summit; expanded limb 2.5–3.5 cm. broad: capsule often densely pilose-hirtellous, sometimes glabrous, 1.4–1.7 cm. long.—*R. strepens, capitulis comosis* Dillenius, Hort. Elth. ii. 330, t. 331 (1732). *R. strepens* L. Sp. Pl. 634 (1753), in part, not L. Mantiss. Alt. 422 (1771). *Anonymos caroliniensis* Walt. Fl. Carol. 168 (1788). *Pattersonia caroliniensis* (Walt.) J. F. Gmel. Syst. 925 (1791), the binomial wrongly ascribed to Walter, p. 167 (instead of 168) with a brief summary of Walter's generic diagnosis. *R. hybrida* Pursh, Fl. Am. Sept. ii, 420 (1814); LeConte in Ann. Lyc. N. Y. i. 140 (1824), in part only; Small, Fl. Se. U. S. 1084 (1903) and Man. 1229 (1933). *R. strepens* sensu Ell. Sk. ii. 109 (1822), not L. emend. *R. caroliniensis* (Walt.) Steud. (as *carolinensis*), Nom. ed. 2, ii. 481 (1841), based only on "*Patersonia carolinensis* Walt.", without further reference, this obviously copied (with change of spelling of both names) directly from J. F. Gmelin; Blake in Rhodora, xxii. 134 (1915), in part, excluding *R. ciliosa* and *R. carol.* var. *parviflora* (Nees) Blake and all synonyms cited under it. *Dipteracanthus strepens*, γ. *Dillenii* Nees in DC. Prodr. xi. 122 (1847), at least as to Dillenian plant. *D. ciliosus*, β. *hybridus* (Pursh) Nees l. c. 123 (1847), in part. *D. Mitchillianus* Nees l. c. (1847). *R. ciliosa*, var. *hybrida* (Pursh) Gray, Syn. Fl. ii¹. 326 (1878), in part.—Sandy woods, Florida, north to eastern South Carolina; Tennessee, Kentucky and eastern Arkansas (unless otherwise noted, specimens distributed as *R. hybrida*). South Carolina: lancaster co.: rocky hillside, 40-

Acre Rock, west of Taxahaw, *Dorothy Huntley*, no. 256 (Duke). HORRY CO.: low woods near Myrtle Beach, July 13, 1932, *Coker & Totten* (NC). GEORGETOWN CO.: sandy woods, Brookgreen Gardens, *F. G. Tarbox*, no. 567 (US). WILLIAMSBURG CO.: rich woods, 10 miles southeast of Gourdin, *Godfrey & Tryon*, no. 433. BERKELEY CO.: Santee Canal, *H. W. Ravenel*, as *R. strepens*, changed by Asa Gray to *R. ciliosa*, var. *hybrida*. CHARLESTON CO.: Charleston, June, 1902, *Wm. Palmer* (US), as *R. parviflora*. BEAUFORT CO.: Bluffton, 1872, *Mellichamp* (Mo, US); St. Helena, 1878, *Laura Towne* (Pa), as *R. ciliosa*. GEORGIA: WITHOUT STATED LOCALITY: *Chapman*, CHATHAM CO.: Savannah, *Mrs. Say*. FLORIDA: WITHOUT DEFINITE LOCALITY: E. Florida, *Chapman* (NY), as *Dipteracanthus Mitchillianus*. DUVAL CO.: dry rich ground near Jacksonville, *A. H. Curtiss*, no. 4764 (Mo, NY, US), as *R. strepens*, one sheet changed to *R. hybrida*, another to *R. parviflora;* St. Nicholas, May 12, 1896, *L. H. Lighthipe* (NY), as *R. ciliosa*, April 20, 1897, *J. R. Churchill;* vicinity of Mayport and Jacksonville, *H. D. Keeler* (NY), as *R. ciliosa;* Hummock, *Fredholm*, no. 5150, as *R. ciliosa*. ST. JOHNS CO.: May 20–22, 1885, *G. C. Whitlock*. CLAY CO.: dry oak woods, Green Cove Springs, April 14, 1939, *W. A. Murrill* (Mo), as *R. ciliosa*. PUTNAM CO.: Crescent City, March, 1880, *G. Marten* (Phil). ALACHUA CO.: open pine woods I mile north of Newberry, *E. Perot Walker*, no. 1862 (Phil), as *R. humilis;* high hummock, Burnett's Lake, April 30, 1939, *W. A. Murrill* (Mo); Gainesville, 1887, *M. F. Price*, as *R. ciliosa*, var. *ambigua;* May 12, 1897, *Joseph Crawford* (Phil.), as *R. ciliosa;* hammock near Gainesville, May 31, 1937, *W. A. Murrill* (Mo), as *R. ciliosa*. VOLUSIA CO.: Port Orange, *F. C. Straub*, no. 120, as *R. ciliosa*, var. *ambigua;* sandy soil, Ormond, April 23, 1903, *H. A. Purdie*, as *R. ciliosa*, altered to *R. humilis;* lush growth by road, north of Ormond, May 16, 1943, *E. H. Butts & Oakes Ames* (Ames); in shade or half-shade, Ormond Beach, May 12, 1943, *Butts & Ames* (Ames); dry soil, Crescent City, June 28, 1943, *E. H. Butts*, as *R. parviflora*. LAKE CO.: vicinity of Eustis, *Nash*, nos. 242 (US) and 1801, July, 1894, *A. S. Hitchcock* (Mo); pinelands east of Eustis, *J. K. Small*, no. 8667 (NY), as *R. parviflora;* dry wood-border, Hiawatha Lake, *Wiegand & Manning*, no. 2932, as *R. parviflora*. SUMTER CO.: Lake Ashtachula, March 29, 1879, *J. D. Smith* (US), as *R. strepens*. HERNANDO CO.: rich open woods, Brooksville. April 9, 1927, *Hugh O'Neill* (Mo). POLK CO.: Peace Creek, March, 1880, *J. D. Smith* (US), as *R. strepens*, dry pineland, April 12, 1894, *L. B. Ohlinger* (Mo), as *R. strepens*. OSCEOLA CO.: sandy soil, Kissimmee, April 5, 1936, *Mary L. Singletary* (Duke). MANATEE CO.: Manatee, *S. M. Tracy*, no. 6758 (NY, US). DADE CO.: pine woods near Rockdale, *J. L. Fennell*, no. 270 (USNA). KENTUCKY: OWEN CO.: about 1

mile north of Scott Co. line, *E. L. Braun*, no. 3204 (Braun). JEFFERSON CO.: 3 miles south of Louisville, July 5, 1892, *L. S. Bergman*, in part (Mo), as *R. ciliosa*. CALLOWAY CO.: upland oak woods just west of the Tennessee River, *Gleason*, no. 8950 (NY). TENNESSEE: COCKE CO.: Newport, June 6, 1925, *O. M. Freeman* (USNA). KNOX CO.: Knoxville, *Ruth*, no. 101, as *R. strepens*. FRANKLIN CO.: Cowan, *Biltmore Herb.*, no. 849[e] (US), as *R. ciliosa;* woods north of Sheridan, June 6, 1897, *H. Eggert* (Mo). DAVIDSON CO.: Ridge Top, July 13, 1897, *Eggert* (Mo). SHELBY CO.: Memphis, *Fendler*, as *R. ciliosa*. ARKANSAS: ST. FRANCIS CO.: Crowley's Ridge, Forrest City, *Demaree*, no. 15,137 (Mo), possibly, when more material available, to be placed elsewhere. PLATES 861–863; MAP 14.

11b. Var. **semicalva,** var. nov. (TAB. 864), var. *typicae* simillima; caule vix villoso-hirsutis; foliis subtus glabrescentibus vel sparse strigosis; capsulis plerumque glabris.—Of much wider range, from central Florida to South Carolina, locally to southeastern Virginia, westward to eastern Texas. VIRGINIA: SOUTHAMPTON CO.: rich woods, Violet Hill, near Devil's Elbow, June 23, 1936, *Fernald, Long & Smart*, no. 5922 (TYPE in Herb. Gray; ISOTYPES in Herb. Phil. Acad., etc.), as *R. ciliosa;* about Franklin, *Heller*, no. 953 (US), as *R. ciliosa*. NORTH CAROLINA: CHATHAM CO.: dry soil, Silver City, Biltmore Herb., no. 849[j] (US), as *R. ciliosa*. COLUMBUS CO.: grassy woodland at Lake Waccamaw, *Godfrey & Shunk*, no. 4170, as *R. parviflora*. NEW HANOVER CO.: Wilmington, June, 1894, *J. M. Macfarlane* (Pa). SOUTH CAROLINA: GEORGETOWN CO.: shady, weedy waste place, Georgetown, *Godfrey & Tryon*, no. 1683. WILLIAMSBURG CO.: rich woods, 10 miles southeast of Gourdin, *Godfrey & Tryon*, no. 433. BERKELEY CO.: railroad right-of-way, south of Moncks Corner, *R. F. Martin*, no. 1130 (USNA), as *R. parviflora*. CHARLESTON CO.: near Charleston, Aug. 1886, *L. R. Gibbes* (NY), as *R. parviflora*. ANDERSON CO.: dry rich woods, Anderson, *John Davis*, no. 9193 (Mo), as *R. parviflora*. GEORGIA: WITHOUT DEFINITE LOCALITY: middle Georgia, *T. C. Porter*. JEFFERSON CO.: July 8, 1897, *M. H. Hopkins* (NY), as *R. parviflora*. LIBERTY CO.: Sunbury, *LeConte* (NY), as *R. ciliosa*. JASPER CO.: fence-corner, 1846, *T. C. Porter* (approaching var. *dentata*). COBB CO.: moist field near brook, Marietta, June 12, 1885, *R. N. Larrabee*. WALKER OR DADE CO.: foot of Lookout Mt. near road out of St. Elmo, June 6, 1921, *O. M. Freeman* (USNA). FLORIDA: LAKE CO.: clay soil, vicinity of Eustis, *Nash*, no. 242. SUMTER CO.: March 29, 1879, *J. D. Smith* (US), as *R. strepens*. CITRUS CO.: moist shaded rock north of Pineola, *H. J. Oosting*, no. 135 (Duke). BREVARD CO: hammock along Indian River, Coco, *J. K. Small*, no. 8727. SEMINOLE CO.: moist grassy clearing, south of Sanford, *Moldenke*, no. 184 (Duke, Mo, NY, Pa), as *R. parviflora*. POLK CO.: sandy

roadside, Winter Park, March 8, 1923, *Hunnewell*, no. 8732 (FWH). HILLSBORO CO.: Tampa, May, 1876, *A. P. Garber* (Phil, US), as *Dipt. ciliosus*. LEON CO.: near Tallahassee, *N. K. Berg* (NY), as *R. parviflora*. WAKULLA CO.: prope St. Marks, Mai, 1843, *Rugel*, with an unpublished name (NY). CALHOUN CO.: Iola, *Chapman* (Mo). TENNESSEE: HAMILTON CO.: old fields, Sequach Valley, Biltmore Herb., no. 849[h] (US), as *R. ciliosa*. ALABAMA: DEKALB AND ETOWAH COS.: Lookout Mt., July 6 and 8, 1898, *H. Eggert* (Mo). ETOWAH CO.: Gadsden, 1878, *G. R. Vasey* (US), as *R. ciliosa*. CULLMAN CO.: woods, June and Sept., 1897, *H. Eggert* (Mo). HALE CO.: Greensboro, 1857, *Sereno Watson*, as *R. ciliosa*, var. *ambigua*. LEE CO.: dry pine woods, *J. D. Smith*, no. 1940 (US), as *R. strepens*. MONTGOMERY CO.: low abandoned field near Montgomery, June 18, 1932, *J. K. Edwards* (Pa). DALLAS CO.: 1879, *Wm. Trelease* (Mo), as *Dipt. ciliosus*. CONECAH CO.: Evergreen, *Baker & Earle*, no. 39 (US), as *R. ciliosa*. MONROE CO.: dry hills, July 23, 1885, *Mohr* (US), as *R. ciliosa*. MOBILE CO.: Mobile, 1905, *W. C. Dukes*, as *R. parviflora;* pine barrens, Spring Hill, *E. W. Graves*, no. 498, in part (Mo). MISSISSIPPI: GRENADA CO.: moist wooded hillside, Pay West's Lake, May 27, 1932, *Vena Millsaps* (NC), as *R. ciliosa*. OKTIBBEHA CO.: Starkville, July 26, 1890, *S. M. Tracy*, as *R. strepens* (NY)—plant habitally resembling var. *dentata*. LAUDERDALE CO.: Meridian, *S. M. Tracy*, no. 3271 (NY), resembling var. *cheloniformis*. JACKSON CO.: Ocean Springs, *Josephine Skehan* as *Seymour & Earle*, no. 154, as *R. ciliosa*, var. *ambigua*, June 7, 1895, *Skehan*, as *R. ciliosa* (simulating var. *cheloniformis*). HARRISON CO.: Biloxi, *S. M. Tracy*, nos. 4944 (Mo, NY, US—very mixed no., some specimens nearly var. *salicina*), 6434 (NY, US), 6435 (G, Mo, NC, NY, US—some plants nearly var. *salicina*, others approaching var. *nanella*), as *R. strepens*. COPIAH CO.: Brushy Creek, Crystal Springs, May 18, 1925 (US), as *R. parviflora*. LOUISIANA: ST. TAMMANY PARISH: vicinity of Covington, *Bro. Anect*, no. 65 (US), as *R. parviflora; Bro. G. Arsène*, no. 12,240 (US), as *R. parviflora*. IBERIA PARISH: moist open grassy woods, Avery Island, *D. S. & H. B. Correll*, no. 9525. RAPIDES PARISH: Alexandria, *Hale* (NY), as *R. strepens*, corrected by Britton to *R. ciliosa*. NATCHITOCHES PARISH: woods near Marthaville, May 5, 1893, *Langlois* (US), as *R. ciliosa*. TEXAS: UPSHUR CO.: sandy woods, Big Sandy, *Reverchon*, no. 2536 (Mo), as *R. parviflora*. LIBERTY CO.: low woods, Dayton, *E. J. Palmer*, no. 7768 (Mo), as *R. parviflora* (plant resembling large-leaved var. *membranacea*). HARRIS CO.: Houston, *G. L. Fisher*, no. 81 (US), as *R. parviflora*. PLATE 864; MAP 15.

11c. Var. SEMICALVA, forma **detonsa,** f. nov., caule, foliis, calycis segmentibusque minute canescento-puberulis eis ecilia-

tis.—FLORIDA: roadside, Sebring, Highland Co., March 4, 1924, *Hunnewell*, no. 9044 (TYPE in Herb. Hunnewell).

11d. Var. **membranacea,** var. nov. (TAB. 865 et 866), caule 1–9 dm. alto ad basin 1–4 mm. diametro, internodiis valde divergenterque hirsutis; foliis membranaceis 5–12 cm. longis supra strigosis subtus ad venas strigosis vel hirsutis, ovalibus, ovatis, ellipticis vel late lanceolatis obtusis vel subacutis; calycis segmentis dorso glabris vel glabrescentibus longe ciliatis—*R. parviflora* sensu Small, Fl. Se. U. S. 1085 (1903) and sensu Britton in Britton & Brown, Ill. Fl. ed. 2, iii. 242 (1913), excl. fig., which is of *R. Purshiana;* not *R. parviflora* (Nees) Britt. Man. 854 (1901), at least as to basonym, *Dipteracanthus ciliosus*, var. *parviflorus* Nees.—Woods, openings and clearings, either calcareous or subacid, north-central South Carolina to south-central Tennessee, north to southern New Jersey, southeastern Pennsylvania, northern Maryland, West Virginia, southeastern Ohio and north-central Kentucky (unless otherwise noted, distributed as *R. caroliniensis, ciliosa* or *parviflora*); usually commoner than other vars. northward. NEW JERSEY: CAPE MAY CO.: woods south of Mill Lane, north of Cape May City, Aug. 10, 1918, *W. Stone* (Phil); north of Cape May, Sept. 13, 1901, *C. S. Williamson* (Phil); Cape May Court House, Aug. 6, 1909, *Van Pelt* (Phil); Cold Spring, Sept. 13, 1908, *C. S. Williamson* (Phil), July 18, 1909, *Van Pelt*, no. 12,199 (Pa). PENNSYLVANIA: YORK CO.: below McCall's Ferry, July 11, 1895, *Joseph Crawford* (Phil). DELAWARE: NEW CASTLE CO.: Aug. 9, 1866, *A. Commons* (NY), as *R. strepens*. KENT CO.: moist woods west of Woodland Beach, *R. R. Tatnall*, no. 1462. SUSSEX CO.: Rehoboth, July 8, 1908, *C. S. Williamson* (Pa, Phil); sandy woods east of Milford, July 16, 1896, *A. Commons* (Pa, Phil). MARYLAND: CECIL CO.: Elk Neck, June 24, 1923, *W. L. Abbott* (Phil); woods, high bluff west of Georgetown, Aug. 6, 1938, *Mrs. L. R. Holmes* (Pa); Leslie, July 15, 1891, *Crawford* (Phil); flats, Conowingo, July 29, 1924, *Crawford;* Conowingo, July 25, 1907, *J. J. Carter* (Phil). KENT CO.: near Chestertown, July 11, 1907, *Shreve*, no. 1696 (US). QUEEN ANNE CO.: Aug. 20, 1900, *G. Vanatta* (Phil). TALBOT CO.: railroad ballast, northwest of St. Michaels, *R. R. Tatnall*, no. 386 (Pa); edge of woods, west of Easton, *E. C. Earle*, nos. 2251 (Pa) and 3698 (Pa). WICOMICO CO.: Salisbury, July 14, 1904, *J. J. Carter* (Phil). WORCESTER CO.: roadside through swamp, north of Dividing Creek Bridge, *G. F. Beaven*, no. 455 (Duke). HARFORD CO.: low, moist woods, Creswell, July 28, 1883, *L. W. Brosius* (Pa). BALTIMORE CO.: Baltimore, *Leroy* (NY). PRINCE GEORGE CO.: Hyattsville, Aug. 13, 1904, *Steele* (Mo). CALVERT CO.: low swampy woods, North Bay, Chesapeake Bay, *Muenscher*, no. 3867 (Mo). MONTGOMERY CO.: edge of woods, July 7, 1901, *M. W. Lyon, Jr.* (US). WASHINGTON

co.: island above Harper's Ferry, *F. W. Pennell*, no. 2430 (Phil). District of Columbia: in vicinis Washington, June 29, 1884, *L. F. Ward;* thickets near Ivy City, June 14, 1891, *F. Blanchard* (Mo), as *R. strepens;* open woodland, Washington and vicinity, July 16, 1896, *Steele* (NY, Mo); Congress Heights, *Philip Dowell*, no. 7012. West Virginia: nicholas co.: dry bank, Peter Creek, *Millspaugh*, no. 596 (NY). mason co.: along Ohio River, near Pum Roy, *E. E. Berkley*, no. 913 (Mo). cabell co.: abandoned wooded pasture, Pleasant Valley, *Gilbert*, no. 483. lincoln co.: near Mills School, *E. E. Berkley*, no. 969 (Mo). wayne co.: dry hillside, Buffalo Creek, *Lewis Plymale*, no. 95. mc dowell and wyoming cos.: woods along Indian Ridge, *E. L. Morris*, no. 1172 (US). Virginia: fairfax co.: Falls Church, June 23, 1872, *J. J. Carter* (Phil). alexandria co.: Naucks, *Pennell*, no. 2456 (Phil); Fort Myer, July 14, 1895, *E. A. Mearns* (NY), as *R. strepens.* northampton co.: sandy woods back of the dunes, Savage Neck, *Fernald & Long*, no. 5453. middlesex co.: bank of Rapahannock River at Gray's Point, *A. B. Massey*, no. 2115 (VPI). mathews co.: sandy open soil along North End Branch, "Fort Nonsense", south of Soles, *Wherry & Pennell*, no. 12,616, in part (Phil). gloucester co.: Beaver Swamp Creek, north of Gloucester, July 5, 1924, *H. B. Meredith* (Phil). york co.: steep wooded bank, York River, above Mt. Folly, *Fernald & Long*, no 13,459. james city co.: rich woods and slopes by James River, Grove Landing, southeast of Grove, *Fernald & Long*, no. 13,457; moist rich soil in woods, west side of Jones Millpond, Williamsburg, *Grimes*, no. 3887. charles city co.: wooded slope by James River, at "Four Oaks", below Harrison Point, *Fernald & Long*, no. 13,149. princess anne co.: rich deciduous woods east of Little Creek, *Fernald & Long*, no. 4193; sandy woods, northern end of Knott's Island, *Fernald & Long*, no. 4194, in part. norfolk co.: Portsmouth, June, 1840, in part, *Rugel* (NY). isle of wight co.: thicket back of sandbeach of Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), *Fernald & Long*, no. 13,150. surry co.: rich calcareous wooded ravines along James River, Claremont, *Fernald & Long*, nos. 13,762 and 13,837; rich calcareous wooded ravine near James River, northwest of Chippokes, July 25, 1941, *Fernald & Long*, no. 13,458. southampton co.: border of sandy woods south of Applewhite's Church, *Fernald & Long*, no. 13,153. sussex co.: border of woods near Nottoway River, Green Church Bridge, southwest of Owen's Store, *Fernald & Long*, no. 12,472 (type in Herb. Gray.; isotype in Herb. Phil. Acad.). greenville co.: bottomland woods along Meherrin River, southeast of Gaskins, *Fernald & Long*, no. 13,151. dinwiddie co.: low woods near Mt. Olivet Church, *Fernald & Long*, no. 14,021. amelia co.: *J. B. Lewis*, nos. 114 and 733 (VPI). brunswick co.: bottomland

woods near Western Bridge, Meherrin River, south of Edgerton, *Fernald & Lewis*, no. 14,498. CAMPBELL CO.: vicinity of Lynchburg, July 1, 1892, *Britton, Britton & Vail* (NY). BEDFORD CO.: July 8, 1871, *A. H. Curtiss* (Mo, NY). ROCKBRIDGE CO.: "Near the natural bridge in rich soil along fences", *Pursh* (Phil), correctly called "*Anonymos caroliniensis* Walt."; Natural Bridge, *Margaret P. Russell*. NORTH CAROLINA: PASQUOTANK CO.: oak-pine-beech woods south of Elizabeth City, *Wiegand & Manning*, no. 2929. TYRRELL CO.: open woodland, Columbia, *Godfrey*, no. 4322. PITT CO.: pine woodland near Farmville, *Godfrey*, no. 4278. WARREN CO.: Warrenton, July 19, 1924, *H. B. Meredith* (Phil). GRANVILLE CO.: wet meadow, Oxford, *M. F. Buell*, no. 1404 (US). DURHAM CO.: shaded low woods, Duke Forest, *Blomquist*, no. 367 (US). WAKE CO.: sandy bank west of Raleigh, *Wiegand & Manning*, no. 2930. BLADEN CO.: moist sandy soil, *Biltmore Herb.*, no. 849[a]. ORANGE CO.: woods near Chapel Hill, Aug. 17, 1909, *Coker* (NC), June 23, 1933, *M. T. Cameron* (NC); dry open woods, Hollow Rock, *C. C. Wilson*, no. 17 (Mo). CHATHAM CO.: dry soil, Silver City, *Biltmore Herb.*, no. 849[j]. FORSYTH CO.: moist woods near Mt. Carmel, *Correll*, no. 2591 (Duke). SURRY CO.: moist shaded cove, Pilot Mt., *R. M. Williams*, no. 464 (Duke). ROWAN CO.: vicinity of Salisbury, *Heller*, no. 140 (NY, Phil). POLK CO.: near Columbus, July 22, 1897, *E. C. Townsend* (US). MADISON CO.: open woods, bluff along river, Hot Springs, *Oosting*, no. 34,230 (Duke). BUNCOMBE CO.: Biltmore, *Biltmore Herb.*, no. 849[b], in part (US); Weaversville, July 8, 1933, *H. B. Teague* (Duke). SWAIN CO.: partly shaded roadside near Cherokee Lodge, rare, *R. A. McLean*, no. 73 (Duke). SOUTH CAROLINA: DARLINGTON CO.: woods at Lauther's Lake, *Budd E. Smith*, no. 1652 (NC). LEXINGTON CO.: vicinity of Batesburg, *E. A. McGregor*, no. 309 (US), as *R. hybrida*. GREENVILLE CO.: summit of Paris Mt., July, 1896, *J. K. Small* (NY). ANDERSON CO.: damp soil, Anderson, *John Davis*, no. 8394 (US, Mo, same no. with label copied and data changed to "dry ground" by B. F. Bush whose Missouri plant grows in dry ground). OCONEE CO.: thickets, *A. P. Anderson*, no. 1222 (US); Clemson College, *H. D. House*, no. 2384 (NY). GEORGIA: CLARKE CO.: roadside, Athens, *L. M. Perry*, no. 1083, as *R. humilis*. OHIO: MEIGS CO.: Letart, Sept. 10, 1935, *C. H. Jones* (NY). KENTUCKY: LOCALITY NOT DEFINITELY PLACED: "Ky river hills, mouth of Hickman Cr.", July, 1832, *C. W. Short*, as *R. strepens* (Phil), sent to Hooker who wrote in 1833: "The other Ruellia [var. *nanella*] with small flow[s] looks diff[t]—But I am much puzzled with the Genus". ROWAN CO.: prairie patch, Clark Mt., *E. L. Braun*, no. 1930 (Braun). MENIFEE CO.: oak woods, dry limestone slope, Red River valley, *E. L. Braun*, no. 2128 (Braun). BELL CO.: rocky woodland, Pineville, *Pennell*, no. 11,804 (Phil);

sandy soil, slope of Pine Mt. at Frakes, *E. L. Braun*, no. 1530 (Braun). ROCKCASTLE CO.: wooded gully, south of Livingston, *Smith & Hodgdon*, no. 3785 (US). OWEN CO.: about 1 mile north of Scott Co. line, *E. L. Braun*, no. 3204 (Braun); wooded slope, Severn Creek, *E. L. Braun*, no. 4578 (Braun). WAYNE CO.: Beaver Creek, *E. L. Braun*, no. 3099 (Braun). JEFFERSON CO.: 3 miles south of Louisville, July 5, 1892, *L. S. Bergmann* (Mo). LARUE CO.: open cedar slope, limestone, Upton, *E. L. Braun*, no. 1970 (Braun). TENNESSEE: SEVIER CO.: Great Smoky Park, near Gatlinburg, 1932, *Mrs. C. D. Walcott* (US). KNOX CO.: Knoxville, *Ruth*, no. 101, as *R. strepens*. HAMILTON CO.: old fields, Sequachie Valley, *Biltmore Herb.*, no. 849[h] (US); Chickamauga Park, May 25, 1911, *J. R. Churchill* (Mo). FRANKLIN CO.: dry soil, Cowan, *Biltmore Herb.*, no. 849[e] (US); woods north of Shernwood, June 6, 1897, *H. Eggert* (Mo). CHEATHAM CO.: limestone bluffs, Kingston Springs, *Svenson*, no. 42. MAP 16.

11e. Var. MEMBRANACEA, forma **breviberbis,** f. nov. (TAB. 867, FIG. 4–6), var. *membranaceae* simillima, caulis internodiis puberulis vel glabrescentibus rare sparseque hirsutis.—Scattered through the general range. MARYLAND: ANNE ARUNDEL CO.: Bay Ridge, July 13, 1897, *F. H. Knowlton* (US). WEST VIRGINIA: CABELL CO.: dry field in clay soil, near Roland Park, *Gilbert & Gilbert*, no. 259 (VPI). NORTH CAROLINA: POLK CO.: wet shaded ground, Tryon, *D. C. Peattie*, no. 1351 (NC). GEORGIA: DEKALB CO.: Stone Mountain, July 1–8, 1886, *Small* (TYPE in Herb. NY. Bot. Gard.). TENNESSEE: COCKE CO.: near Wolf Creek, *Kearney*, no. 863 (US).

11f. Var. MEMBRANACEA, forma **hypopsila,** f. nov. (TAB. 867, FIG. 1–3), var. *membranaceae* simillima; caulis internodiis plerumque pubescentibus; foliis subtus glabris vel subglabris, vix strigosis, supra strigosis; calycis segmentis ciliatis.—Occasional in Virginia and North Carolina. VIRGINIA: ELIZABETH CITY CO.: Old Point Comfort, Sept. 15, 1895, *Britton* (NY). NORFOLK CO.: near Northwest, *Kearney*, no. 1565 (US). SURRY CO.: border of bottomland woods along Blackwater River, about 1 mile southwest of Dendron, June 14, 1941, *Fernald & Long*, no. 13,148 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.), no. 13,491 (fruit of preceding). SOUTHAMPTON CO.: dry sandy pine woods by Nottoway River, near Carey Bridge, *Fernald & Long*, no. 13,147; alluvial wooded bottomland of Nottoway River, Cypress Bridge, *Fernald & Long*, no. 8470; wooded alluvial bottomland of Meherrin River, near Haley's Bridge, *Fernald & Long*, no. 8471. SUSSEX CO.: bottomland woods along Nottoway River, east of Huske, *Fernald & Long*, no. 13,761. NORTH CAROLINA: ORANGE CO.: meadow below Durham-Chapel Hill Bridge, June 26, 1915, *Coker & Totten*, transition to next form (NC).

11g. Var. MEMBRANACEA, forma **laevior,** f. nov. (TAB. 868), var. *membranaceae* simillima; caulis internodiis glabrescentibus; foliis utrinque glabris glabrescentibusve; calycis laciniis eciliatis vel vix ciliatis.—Local, Virginia and North Carolina. VIRGINIA: SOUTHAMPTON CO.: wooded alluvial bottomland of Meherrin River, near Haley's Bridge, *Fernald & Long,* no. 9151. GREENSVILLE CO.: bottomland woods along Meherrin River southeast of Gaskins, Aug. 3, 1941, *Fernald & Long,* no. 13,462 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). AMELIA CO.: July 1, 1936, *J. B. Lewis,* no. 114 (VPI). NORTH CAROLINA: ORANGE CO.: swamp of New Hope Creek, 5 miles east of Chapel Hill, June 30, 1931, *H. R. Totten* (NC); meadow 3 miles out from Chapel Hill, on Raleigh Road, 1931, *T. N. Webb* (NC).

11h. Var. **nanella,** var. nov. (TAB. 869 et 870, FIG. 1), caule filiformi ad basin 1–2 mm. diametro 1–3(–4) dm. alto, internodiis valde divergenter villoso-hirsutis; foliis membranaceis, ellipticis vel oblongis majoribus 2–6 cm. longis; calycis segmentis 1.3–2 cm. longis, ciliatis dorso plerumque glabrescentibus.—Dry to moist woods, local, eastern Maryland to Kentucky, south to South Carolina; southern Mississippi. MARYLAND: CECIL CO.: loamy, wooded slope, Duffy Creek, 2 miles southeast of Cecilton, *B. Long,* no. 48,422 (Phil.); North East, Sept. 2, 1894, *Joseph Crawford* (Phil), transition to var. *membranacea.* KENT CO.: Chestertown, July 29, 1901, *E. G. Vanatta* (Phil), transition to var. *membranacea.* CHARLES CO.: dense woods, Tompkinsville, *Leonard & Killip,* no. 838 (US). VIRGINIA: NANSEMOND CO.: near Suffolk, *Kearney,* no. 1718 (US); dry sandy woods above Nansemond River, east of Cahoon Pond, northwest of Suffolk July 23, 1941, *Fernald & Long,* no. 13,461 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). PRINCESS ANNE CO.: Oceana, July 2, 1923, *H. B. Meredith,* in part (Phil), transition to var. *membranacea;* dry, mixed woods, Little Neck, *Fernald & Long,* no. 4195, transition to var. *membranacea.* NORTH CAROLINA: HALIFAX CO.: Weldon, July, 1875, *Mac Elwee* (Phil). MCDOWELL CO.: Old Fort, June, 1872, *Walter Faxon.* ORANGE CO.: Chapel Hill, July, 1931, *Vena Millsaps* (NC). SOUTH CAROLINA: DARLINGTON CO.: damp shady woods near Auburn, June 27, 1909, *Coker* (NC). KENTUCKY: poor dry hill on the Kentucky River, 1832, *C. W. Short* (Phil), this material referred to Hooker (see note under Kentucky specimens of var. *membranacea*), with the following note: "Is this plant specifically distinct from *R. strepens* in another part of the Collection? Found on a poor dry hill on the Ky river. It flowers later than the former & is much more starved in its growth." MISSISSIPPI: JACKSON CO.: Ocean Springs, *A. B. Seymour,* no. 91 8 22, as *R. ciliosa.* HARRISON CO.: Biloxi, *Lloyd & Tracy,* no. 347, in part (NY). MAP. 17.

11i. Var. NANELLA, forma **eciliata,** f. nov. (TAB. 870, FIG. 2–4),

var. *nanellae* simillima, internodiis glabrescentibus vel puberulentibus; foliis vix vel minutissime strigosis; calycis laciniis eciliatis.—Local, southeastern Virginia: southampton co.: dry sand of open alluvial flat by Blackwater River, southeast of Unity, July 4, 1942, *Fernald & Long,* no. 14,412 (type in Herb. Gray.; isotype in Herb. Phil. Acad.); white sand of pine and oak woods at Round Gut, southwest of Franklin, *Fernald & Long,* no. 13,154. sussex co.: bushy clearing southeast of Stony Creek, *Fernald & Long,* no. 13,145, taller plants, transitional to var. *membranacea,* forma *laevior.* Mississippi: simpson co.: Magel, *E. G. Holt,* no. 5 (US), as *R. humilis.*

11j. Var. **cheloniformis,** var. nov. (tab. 871 et 872), caule stricto vix vel sparse ramoso 4.5–9 dm. alto basin versus 2–5 mm. diametro plus minusve hirsuto; foliis subcoriaceis firmis duris lanceolatis vel lanceolato-ovatis subacuminatis, majoribus (supernis) 6–12 cm. longis 2–4.5 cm. latis, subtus ad venas strigosis vel hispidis supra strigosis; nodis floriferis 1–4 approximatis vel imis 3–15 cm. distantibus; glomerulis congestis; calycis laciniis dorso glabris vel sparse hirsutis ciliatis; corollis 3–4.5 cm. longis.—Woods and clearings, north-central South Carolina and northern Georgia, north to southern New Jersey, northern Maryland and northern Virginia, more rarely to Kentucky and southern Indiana. New Jersey: cape may co.: margins of fresh meadows east of Cape May Court House, *Long,* no. 6685 (Phil), appr. var. *membranacea;* Cape May Court House, 1886, *Isaac Burk* (Pa, Phil); woods, Cold Spring, July 18, 1908, *Van Pelt* (Phil). Delaware: sussex co.: Rehoboth, July 8, 1908, *Van Pelt* (Phil). Maryland: cecil co.: North East, July 20, 1890, *J. B. Brinton* (Pa), as *R. strepens;* Elk Neck, June 24, 1923, *W. L. Abbott* (Phil); moist soil below Cromley's Mount, *Pennell,* no. 1591 (Pa). montgomery co.: Little Falls Brook, *Pennell,* no. 2439 (Phil). st. marys co.: Point Lookout, July 13, 1930, *O. M. Freeman* (USNA). District of Columbia: Brookland, July 17, 1897, *Carrie Harrison* (USNA). Virginia: clarke co.: woods, Boyce, *Hunnewell,* no. 10,742 (FWH). northampton co.: dry woods, Savage Neck, July 19, 1936, *R. R. Tatnall,* no. 3013 (type in Herb. Gray.). gloucester co.: Beaver Swamp Creek, north of Gloucester, July 5, 1924, *H. B. Meredith* (Phil), as *R. parviflora.* elizabeth city co.: Hampton, July 22, 1927, *J. R. Churchill,* (Mo), as *R. strepens.* james city co.: open places in moist hardwood ravine, southwest of Williamsburg, *Grimes,* no. 4609 (NY); Jamestown, June 24, 1924, *H. B. Meredith* (Duke). princess anne co.: Virginia Beach, July 3, 1892, *Britton, Britton & Vail* (NY); pine woods, Virginia Beach, *Fernald & Long,* no. 4191; sandy woods, Knott's Island, *Fernald & Long,* no. 4194, in part. norfolk co.: Portsmouth, June, 1840, *Rugel* (NY). dinwiddie co.: low open pineland, thickets

and clearings just east of McKenney, *Fernald & Long*, no. 14,413. MECKLENBURG CO.: roadside-thicket, 6 miles north of Clarksville, *F. R. Fosberg*, no. 15,463. HALIFAX CO.: old clearing, east of Dan River, *Fosberg*, no. 15,384. NORTH CAROLINA: CAMDEN CO.: low, moist bushy soil, near Shiloh, *Correll*, no. 2068 (Duke). WASHINGTON CO.: moist soil near Scuppermong, *Correll*, no. 1918 (Duke). GREENE CO.: pine woodland, Farmville, *Godfrey*, no. 4278 (Duke, US), transition to var. *membranacea*. WAKE CO.: pine woodland along Crabtree Creek, 8 miles northwest of Raleigh, *Godfrey*, no. 4991, in part. HARNETT CO.: Buie's Creek, June 29, 1938, *Frances & Sarah Fount* (NC). ROWAN CO.: Salisbury, June, 1872, *LeRoy & Ruger*, in part (NY). FORSYTH CO.: woods, June 20, 1940, *Schallert*. ALEXANDER CO.: on bank, road from Gelreath P. O. to Hidnite, *Radford & Stewart*, no. 1600 (NC). MC DOWELL CO.: Old Fort, *Biltmore Herb.*, no. 849^{i} (US). BUNCOMBE CO.: Biltmore, *Biltmore Herb.* no. 849^{b}, in part, mixed with var. *membranacea* (US). POLK CO.: Tryon, July 22, 1897, *E. C. Townsend*, in part (US). SOUTH CAROLINA: FLORENCE CO.: sandy, shady banks of Pee Dee River, near Mars Bluff Bridge, *Wiegand & Manning*, no. 2931, as *R. parviflora*. CHARLESTON CO.: near Charleston, 1856, *L. R. Gibbes* (NY), as *R. parviflora*. OCONEE CO.: Clemson College, *H. D. House*, no. 2384 (US), as *R. parviflora*. GEORGIA: WITHOUT STATED LOCALITY: *Boykin* (NY), as *Dipteracanthus hybridus; Porter*, 1846 (Phil) "mid. Georgia, 1846," *Porter*, with the comment: "There is a good deal of confusion among the Ruellias". CLARKE CO.: Athens, June 28, 1930, *J. H. Pyron* (Duke). GWINNETT CO.: Yellow River, near McGuire's Mill, July 2, 1895, *Small* (NY), as *R. ciliosa*, changed by Small to *R. parviflora;* Thompson's Mills, *Allard*, no. 225 (NY, US). FLOYD CO.: Rome, July, 1888, *Gerald McCarthy* (US). INDIANA: JEFFERSON CO.: Hanover, July, 1875, *A. H. Young* (NY). CRAWFORD CO.: roadside near Leavenworth, *Deam*, no. 16,473 (NY), as *R. strepens*. KENTUCKY: ROCKCASTLE CO.: wooded gully south of Livingston, *Smith & Hodgdon*, no. 3758 (G), as *R. strepens*. MAP 18.

11k. Var. **salicina,** var. nov. (TAB. 873), caule simplice vel sparse breviterque ramosi tenui 1.5–7 dm. alto canescenti-puberulo vel subvilloso; nodorum superiorum foliis longioribus anguste lanceolatis vel lanceolato-linearibus 0.5–1.5(–2) cm. latis subtus glabrescentibus vel sparse strigosis; calycis segmentis dorso canescenti-pilosis vel glabrescentibus ciliatis; corollis 2–3 cm. longis, fauce supra 5–10 mm. diametro.—Northern Florida to eastern Texas, north, locally, to northern Georgia, Tennessee and southern Indiana. GEORGIA: GWINNETT CO.: Thompson's Mills, *Allard*, no. 224 (US), as *R. parviflora*. FLOYD CO.: deciduous woodland, Horseleg Mt., *Pennell*, no. 4099 (Pa). FLORIDA: GADSDEN CO.: open dry woods of pine and oak, River Junction,

Wiegand & Manning, no. 2933. LAKE CO.: dense, moist woodland, Hawkinsville, May 7, 1910, *S. C. Hood* (Mo). INDIANA: CLARK CO.: wet grassy and rocky shore, southwest of Charleston, *F. J. Hermann*, no. 6730. TENNESSEE: DAVIDSON CO.: copses, vicinity of Nashville, Sept., 1885, *Gattinger*. SHELBY CO.: Normal, *C. E. Moore*, no. 69 (US). ALABAMA: BLOUNT CO.: Blount Springs, May 5, 1898, *C. F. Baker* (NY), as *R. pedunculata*. MONROE CO.: Perdue Hill, July 22, 1885, *C. Mohr* (US), as *R. ciliosa*, var. *hybrida*, this altered to var. *ambigua*, then the sheet, in spite of petioles 1.5 cm. long, annotated as the sessile-leaved *R. humilis!* MOBILE CO.: pine barrens and dry pastures, Spring Hill, *E. W. Ganes*, no. 948, in part (US)—the sheet also containing var. *semicalva* and *R. ciliosa*. MISSISSIPPI: CLARKE CO.: Enterprise, *S. M. Tracy*, no. 3288 (NY), as *R. ciliosa*, altered to *R. parviflora*. LOUISIANA: WITHOUT STATED LOCALITY: *Steinhaur*. ORLEANS PARISH: New Orleans, *Drummond*, no. 257, as *Dipteracanthus strepens*, another, with no., as *Calophanes humistrata*. NATCHITOCHES PARISH: open ground, Natchitoches, June 10, 1915, *E. J. Palmer*, no. 7945 (TYPE in Herb. N. Y. Bot. Gard.; ISOTYPES in Herb. Mo. Bot. Gard. and U. S. Nat. Herb.) RAPIDES PARISH: pine-barren hills, vicinity of Alexandria, *C. R. Ball*, nos. 559 (US), as *R. strepens*, and 655, in part (Mo)—the latter mixed on a sheet with *R. humilis* var. *frondosa* and quite like the other sheets of no. 559 (presumably the former mixed in handling). IBERIA PARISH: moist open grassy woods, Avery Island, *D. S. & H. B. Correll*, no. 9525. TEXAS: UPSHUR CO.: sandy woods, Big Sandy, *Reverchon*, no. 2536 (Mo); damp sandy soil, Big Sandy, *Reverchon*, no. 1402 (simulating small var. *dentata*). GREGG CO.: rich sandy woods, Gladwater, June 18, ..., *Reverchon* (Mo). WOOD CO.: damp woods, Mineola, *Reverchon*, no. 2113 (Mo). HARRIS CO.: White Oak Bayou, 4 miles west of Houston, *Lindheimer*, no. 40 (data and no., Mo.; two sheets without no., G), as *R. strepens*. MAP 19.

111. Var. **dentata** (Nees), comb. nov. Stem stiff and relatively strong, simple or more often with ascending branches, the main axis 1.5–9 dm. long, hirsute to puberulent; the lower and median internodes elongate; 4–9 nodes bearing glomerules; leaves oblong, oblong-lanceolate, ovate or elliptic, subcoriaceous, often undulate-dentate, blunt or acutish, the lower and middle ones subequal, the upper reduced and definitely smaller; flowers occasionally cleistogamous; calyx-segments ciliate, 1.8–2.5 cm. long.—*Dipteracanthus ciliosus*, β. *dentatus* Nees in DC. Prodr. xi. 123 (1847).—Chiefly in dry woods and clearings, upland of South Carolina, western North Carolina and eastern Tennessee, north to Delaware, southeastern Pennsylvania, Maryland, northern Virginia, West Virginia, Kentucky and southeastern Indiana. PENNSYLVANIA: YORK CO.: below McCall's Ferry,

July 11, 1895, *Crawford* (Phil). DELAWARE: NEW CASTLE CO.: north end of cedar scrub, near Taylor's Bridge, July 28, 1891, *A. Commons.* SUSSEX CO.: oak copse, Rehoboth, Sept. 5, 1908, *J. R. Churchill.* MARYLAND: CECIL CO.: Conowingo, July 25, 1907, *J. J. Carter* (Phil). BALTIMORE CO.: near Baltimore, 1866, *P. V. LeRoy* (NY). CALVERT CO.: dry woods, Chesapeake Beach, *Hunnewell*, no. 5666 (FWH). WICOMICO CO.: Salisbury, July 14, 1904, *J. J. Carter* (Phil). DISTRICT OF COLUMBIA: June 22, 1902, *Steele* (Duke). WEST VIRGINIA: NICHOLAS CO.: dry bank, Peter Creek, *Millspaugh*, no. 596 (NY), as *R. ciliosa.* VIRGINIA: FAIRFAX CO.: woods, Great Falls, *Hunnewell*, no. 7027 (FWH). JAMES CITY CO.: dry slope about 3 miles north of Williamsburg, *R. W. Menzel*, no. 30, as *R. strepens.* HENRICO CO.: Fairway Ridge, near Richmond, July 10, 1928, *F. H. W.* PRINCESS ANNE CO.: pine woods, Virginia Beach, Sept. 25 and 28, 1900, *Wm. Palmer* (US); Oceana, July 2, 1923, *H. B. Meredith*, in part (Phil); open clay at border of woods, east of Little Creek, *Fernald & Long*, no. 4192. NORFOLK CO.: dry sandy roadside, Ocean View, July 3, 1923, *H. B. Meredith* (Phil). NANSEMOND CO.: moist clearing, site of extinct Marsh's Millpond, *Fernald & Long*, no. 14,414. ISLE OF WIGHT CO.: sandy, recently cleared woods along Blackwater River, below Broadwater Bridge, north of Zuni, *Fernald & Long*, no. 13,460. SUSSEX CO.: dry sandy woods, thickets and clearings, north of Moore's Mill, *Fernald & Long*, no. 6397; dry woods near Nottoway River, Green Church Bridge, northwest of Owen's Store, *Fernald & Long*, no. 14,020. HALIFAX CO.: old clearing, east of Dan River, 12 miles east of Danville, *F. R. Fosberg*, no. 15,384 (Pa). ORANGE CO.: field, Orange, *Killip*, no. 13,248 (US). NORTH CAROLINA: ORANGE CO.: Arboretum and Campus of Univ. N. C., July 1, 1914, *Coker* (NC). POLK CO.: banks and meadows, "Valhalla", Tryon, *D. C. Peattie*, no. 626 (NC). MADISON CO.: Warm Spring, Aug. 23, 1875, *J. H. Redfield* (Mo). BUNCOMBE CO.: Asheville, *B. L. Robinson*, no. 59, as *R. strepens;* Biltmore, *Biltmore Herb.* no. 849 (US). ROWAN CO.: vicinity of Heilig's Mill, *Small & Heller*, no. 139 (Phil, US). JACKSON CO.: near Dillsboro, Sept. 9, 1933, *Alexander, Everett & Pearson* (NY). SOUTH CAROLINA: DARLINGTON CO.: east side of Lynches River near Clyde, *B. E. Smith*, no. 1653 (NC). ANDERSON CO.: dry ground, Anderson, *John Davis*, no. 8369 (Mo). INDIANA: FLOYD CO.: wooded hillside and along railroad, west of New Albany, *Deam*, no. 14,010. KENTUCKY: ROCKCASTLE CO.: near Conway, *E. L. Braun*, no. 3132 (Braun). PULASKI CO.: thin soil over limestone, south of Burnside, *Wherry & Pennell*, no. 13,786 (Phil). EDMONSON CO.: near Sweeden, *E. L. Braun*, no. 3593 (Braun). WARREN CO.: Bowling Green, July 3, 1889, *Sadie F. Price*, painting (Mo). BALLARD CO.: woods, Wickliffe, *McFarland & Anderson*, no. 293

(Mo). Tennessee: blount co.: damp woods 2 miles east of Townsend, *W. M. Benner*, no. 5803 (Phil). Plates 874 and 875; map 20.

Of all the species of *Ruellia* in the eastern United States *R. caroliniensis* is the most baffling, for in different areas it is reasonably definable as geographic varieties, but, at least in eastern Virginia, plants with strongly spreading-hirsute stems and others with the internodes merely puberulent or short-pilose will occur side-by-side, while in other colonies may be found individuals with the leaves strongly hispid on the veins beneath almost mingled with individuals with the lower leaf-surfaces glabrous. In general the more northern series (vars. *membranacea*, *nanella*, *cheloniformis* and *dentata*) have the soft villosity or pilosity of stem or leaves less marked than in the more southern vars. *typica*, *semicalva* and *salicina*. In the three latter, furthermore, the leaf-blade is rather "full", so that the pressed foliage commonly puckers or has a "tuck" and the calyx-segments are commonly canescent on the back. In the more northern varieties, on the contrary, the leaf-blade is readily flattened in pressing and the calyx-segments are glabrous or only exceptionally pubescent on the back. When well developed the stems of the southern vars. *typica* and *semicalva* tend to divergent branching, with the elongate branches floriferous at tip, but simple-stemmed plants somewhat obscure this character. In the northern series the branching, except sometimes (as in var. *dentata*) from the base, is weak, most plants having simple stems or few short and rarely floriferous branches.

The commoner northern plants fall into the thin-leaved var. *membranacea* (with several minor forms based upon development or lack of development of trichomes on the leaves or of cilia on the calyx-segments), which passes insensibly, on the one hand, into the stouter, stiffer and firmer-leaved var. *cheloniformis*, on the other into the dwarf, very slender and small-leaved var. *nanella*, the latter, or something very like it, reappearing in southern Mississippi, where it passes into weak unbranched states of the southern var. *semicalva*. In the extreme South, furthermore, the narrow-leaved var. *salicina*, very definite in its extreme development, merges into var. *semicalva* and strongly suggests the narrowest-leaved extreme of the usually more

northern var. *cheloniformis*. Var. *dentata*, with great reduction of leaves above, with the lower and median leaves nearly uniform, with strong tendency to develop elongate and floriferous basal branches, and its great abundance of glomerules, is as definite as any of the varieties, but some specimens show evident transition to vars. *salicina*, *semicalva*, *cheloniformis* and *membranacea*. In short, the species, like the usually more western *R. humilis*, is evidently in a state of flux and I am unable to find in it really stable characters.

The identifications of the past clearly show how perplexing have been the many variations of this most complex species, especially to those without any field-experience with it. It has been variously known or identified as *R. strepens* L. (our species 2, PLATES 841 and 842), or *R. pedunculata* Torr. (our species 3, PLATE 843), mixed in collections with *R. Purshiana* (our species 5, PLATES 845 and 846), identified as *R. ciliosa* Pursh (our species 7, PLATES 849 and 850) or as *R. humilis* Nutt. (our species 10, PLATES 854–860).

It was described and illustrated by Dillenius (our PLATE 863) and his description and plate were included in the *R. strepens* of Linnaeus (1753), but later excluded by him. In fact, Elliott, apparently not cognizant of the redefinition of *R. strepens* by Linnaeus (1771), was puzzled by the restriction of the latter name by authors who had Mantissa Altera. Describing in detail *Ruellia caroliniensis*, var. *typica*, as *R. strepens*, "the whole plant hairy . . . *Calyx* [-segments] . . . linear-lanceolate, the upper half almost setaceous, very hispid", and correctly citing for his South Carolina plant the Dillenian plate and *Anonymos caroliniensis* Walter, 168, Elliott thus expressed his perplexity: "I know not how Pursh could have called [correctly following the emended description of Linnaeus in 1771] the segments of the calyx lanceolate, they are very accurately represented by Dill. Hort. Elth. T. 249, F. 321, excepting that in number 5 and 6 the setaceous points are not sufficiently extended, but in number 1 from which he derived the epithet Comosa, the representation is very accurate."

Although the Walter type of his *Anonymos caroliniensis*, p. 168, basis of *Ruellia caroliniensis*, is lost, his generic description was good and his specific description well applies to the southern

plant, which occurs abundantly in eastern South Carolina and about Savannah (see MAP 14). Since the other strongly pubescent ("hirsute") varieties (vars. *membranacea, cheloniformis* and *dentata*) barely reach the northern half of South Carolina from the north (see MAPS 16, 18 and 20) we are quite safe in identifying as Walter's plant the variety which abounds in the region he best knew. *R. caroliniensis* (var. *typica*) was next described by Pursh as *R. hybrida* (1814), evidently from the strongly branching state: "R. erecta, ramosissima, pilis albidis hirsuta; foliis . . . dense hirsutis, . . . calycis laciniis linearibus tubo corollae vix brevioribus. In sandy fields near Savannah, Georgia", where our plant abounds. If it were not for the earlier name of Walter the correct name of this species would be *R. hybrida* Pursh, the name used for the canescent-villous extreme by Small and others. Nees, who sadly mixed the identities of our American species and varieties, again beautifully described typical *R. caroliniensis* as *Dipteracanthus Mitchillianus* (1847), emphasizing the stem "pube albâ densê incano pilisque patulis hirsutis", the oval-oblong to oblong and obtusish leaves decurrent into petioles, the blades "utrinque laxe hirsutis", the linear-setaceous calyx-segments "albo-hirsutissimis" and about half as long as the corolla-tube. That was a first-rate description. Unfortunately, in the same treatment Nees published the ill-described *D. ciliosus*, "γ. *parviflorus*, corollâ vix pollicari, foliis paullo longiori petiolo (3–6-pollicari)", from Kentucky. As already sufficiently emphasized, a plant with petioles 3–6 inches long is quite impossible in *Ruellia* (at least in ours). Nevertheless, the impossible description by Nees has been made the basis for a specific combination, *R. parviflora* (Nees) Britton, and for the varietal combination, *R. caroliniensis*, var. *parviflora* (Nees) Blake; and in recent years these ill-founded names have largely appeared on the labels of most of the varieties and forms of *R. caroliniensis*.

The confusion in the use of names is here perhaps somewhat cleared. The presentation of the varieties and forms may later need revision. After some years of puzzling over the misbehavior of these inconstant trends, I have done the best I can with them. Future and wiser students may work out a better treatment.

Explanation of Plates

Plate 839. Ruellia Brittoniana Leonard: fig. 1, summit of plant, × 1, from Houma, Louisiana, *Wurzlow;* fig. 2, summit of peduncle and calyx, × 4, from *Wurzlow;* fig. 3, corolla, × 1, from *Wurzlow;* fig. 4, calyx and capsule, × 2, from *Wurzlow.*

Plate 840. R. Tweediana Griseb.: figs. 1 and 2, portions of branching plant, × 1, from Colonia Benitez, Chaco, Argentina, *A. G. Schulz,* no. 778; fig. 3, summit of peduncle and base of calyx, × 4, from no. 778; fig. 4, tip of calyx-segment, × 10, from no. 778; fig. 5, corolla, × 1, from no. 778.

Plate 841. R. strepens L.: fig. 1, flowering median node, × 1, from near Chattanooga, Tennessee, May 27, 1911, *J. R. Churchill;* fig. 2, corolla, with one basal bract removed, × 1, from near State Lake, Union Co., Kentucky, *Shacklette,* no. 345; fig. 3, flower, showing broad calyx-segment, × 1, from no. 345; fig. 4, long-peduncled fruit, × 1, from Powell's Creek, Garysville, Virginia, *Fernald & Long,* no. 8472.

Plate 842. R. strepens, forma cleistantha (Gray) S. McCoy: fig. 1, summit of characteristic plant, × ⅗, from South Lebanon, Ohio, *E. B. Harger,* no. 8010; fig. 2, a terminal glomerule, × 1, from Mammoth Cave, Kentucky, *E. L. Braun,* no. 3611; fig. 3, node with large cleistogamous flower, × 1, from Deerfield, Vernon Co., Missouri, *Palmer & Steyermark,* no. 42,140; fig. 4, terminal glomerule with 2 (upper) small cleistogamous flowers, × 2, from Joplin, Missouri, *E. J. Palmer,* no. 1310; fig. 5, subterminal fruiting node, × 2, from McDonald Co., Missouri, *E. J. Palmer,* no. 4069; fig. 6, calyx and open capsule, × 2, from St. Louis, Missouri, August 19, 1905, *A. G. Johnson.*

Plate 843. R. pedunculata Torr.: fig. 1, small flowering plant, × 4/9, from Natchitoches, Louisiana, *E. J. Palmer,* no. 7511; fig. 2, base of more branching fruiting plant, × ½, from Monteer, Missouri, *Bush,* no. 6401A; fig. 3, portion of branching inflorescence, × 1, from near Arcadia, Missouri, *Greenman,* no. 3764; fig. 4, calyx and capsule, × 2, from Baker Springs, Howard Co., Arkansas, October 5, 1909, *J. H. Kellogg;* fig. 5, calyx-segments and base of capsule, × 10, from last specimen; fig. 6, strigose surface of capsule, × 10, from same specimen.

Plate 844. R. pinetorum Fernald: fig. 1, flowering and fruiting branches, × 1, from type; fig. 2, portion of fruiting branch, × 1, from type; fig. 3, portion of leafy base, × 1, from Lake Charles, Louisiana, *Andrew Allison,* no. 261; fig. 4, calyx and capsule, × 2, from type; fig. 5, surface of peduncle, × 10, from type; fig. 6, bases of calyx-segment and capsule, × 10, from type.

Plate 845. R. Purshiana Fernald: fig. 1, portions of type, × ⅖; fig. 2, third node from base, with solitary flower, × 1, from Cedar Creek, Frederick Co., Virginia, *Hunnewell,* no. 11,135; fig. 3, second node from base, with solitary flower, × 1, from Natural Bridge, Virginia, May 28, 1909, *E. B. Bartram;* fig. 4, calyx and capsule, × 2, from Dixie Caverns, Roanoke Co., Virginia, *C. E. Wood, Jr.,* no. 3673; fig. 5, surface of stem, × 4, from *Wood,* no. 3673.

Plate 846, figs. 1 and 2. R. purshiana, forma claustroflora Fernald: fig. 1, summit of type, × 1; fig. 2, uppermost node, with a tiny cleistogamous flower (upper right) and a capsule, × 2, from Natural Bridge, Virginia, September 4, 1885, *N. L. & E. G. Britton.* Fig. 3, R. Purshiana: summit of capsule, showing pilose surface, × 10, from *Wood,* no. 3173.

Plate 847 and 848. R. heteromorpha Fernald. Plate 847, vernal stage: fig. 1, flowering stem, × 1, from near Camp Longview, Florida, *Small & Wilson,* no. 1700; figs. 2 and 3, flowering tips, × 1, from southeast of Fort Myers, Florida, *Jeanette P. Standley,* no. 444; fig. 4, summit of internode and base of leaf, × 4, from between Cutler and Longview Camp, Florida, *Small & Carter,* no. 1097; fig. 5, base of calyx, × 10, from Big Pine Key, Monroe Co., Florida, *Small,* no. 8142. Plate 848, later cleistogamous stage: fig. 1, portion of a long fruiting branch, × 1, from between Peter's Prairie and Homestead, Florida, *Small & Carter,* no. 2701; figs. 2 and 3,

branchlets from more open fruiting branch, × ½, from between Coconut Grove and Cutler, Florida, *Small & Carter*, no. 1273; FIG. 4, tip of branchlet with two cleistogamous flowers, × 1, from Ross-Costello Hummock, Dade Co., Florida, *Small, Mosier & Small*, no. 6552; FIG. 5, calyces and capsules, × 2, from no. 1273.

PLATES 849 and 850. R. CILIOSA Pursh: PLATE 849, FIG. 1, plant, × 1, from Cape Savannah, Sumter Co., South Carolina, *Witmer Stone*, no. 426; FIGS. 2 and 3, plants, × 1, from Poulan, Worth County, Georgia, *Pollard & Maxon*, no. 574; FIG. 4, summit of internode and base of cauline leaf, × 4, from River Junction, Gadsden Co., Florida, *Wiegand & Manning*, no. 2927; FIG. 5, calyx and capsule, × 2, from no. 2927. PLATE 850, FIG. 1, plant, × 1, from Florida, May, *A. H. Curtiss;* FIG. 2, basal branch, × ⅗, from Clarcona, Orange Co., Florida, *A. J. Pieters*, no. 120; FIG. 3, basal branch, × 1, from Duval Co., Florida, *A. H. Curtiss*, no. 1944*.

PLATE 851. R. SUCCULENTA Small: FIG. 1, flowering plant, × ⅖, from Everglades west of Perrine, Florida, *Small*, no. 7880; FIG. 2, fruiting branch, × 1, from between Coconut Grove and Cutler, Florida, October 31–November 4, 1903, *Small & Carter;* FIG. 3, summit of internode and bases of leaves, × 4, from same collection as fig. 2; FIG. 4, lower surface of leaf, showing cystoliths, × 10, from Bay Biscayne, Florida, *A. H. Curtiss*, no. 5500E; FIGS. 5 and 6, median and terminal flowering nodes, × 1, from same specimen, as fig. 1; FIG. 7, calyx and fruit, × 2, from east of Florida City, Dade Co., Florida, *Small*, no. 8080.

PLATES 852 and 853. R. NOCTIFLORA (Nees) Gray: PLATE 852, FIG. 1, base of plant, × 1, from southeast of Ludowici, Georgia, *Wiegand & Manning*, no. 2928; FIG. 2, flowering tip, × 1, from no. 2928; FIG. 3, summit, × 1, of ISOTYPE, from inter St. Marks et Port Leon, Florida, *Rugel;* FIG. 4, flowering tip, × 1, from Apalachicola, Florida, 1867, *Chapman;* FIG. 5, summit of internode and bases of leaves, × 4, from Apalachicola, *Chapman;* FIG. 6, calyx and capsule, × 2, from Biloxi, Mississippi, *S. M. Tracy*, no. 6500. PLATE 853, FIG. 1, summit of flowering stem to show long calyx-segments, × 1, from near Sunbury, Liberty Co., Georgia, *LeConte* (probable type or isotype of *R. tubiflora* LeConte); FIG. 2, fruiting summit, × 1.8, from Port St. Joe to Apalachicola, Florida, *Small, Small and De Winkeler*, no. 11,417; FIG. 3, bract, calyx-segment and base of capsule, × 10, from *Tracy*, no. 6500; FIG. 4, surface of capsule, × 10, from no. 6500.

PLATES 854 and 855. R. HUMILIS Nutt., var. TYPICA: PLATE 854, FIG. 1, TYPE OR ISOTYPE, × 1; FIG. 2, summit of primary axis, × 1, from Mercersburg, Pennsylvania, 1846, *Ruel;* FIG. 3, calyces and capsules, × 2, from Butler Co., Missouri, *Bush*, no. 3739. PLATE 855, FIG. 1, median nodes of primary axis, × 1, from west of Hannibal, Missouri, *John Davis*, no. 4646; FIG. 2, summit of internode and bases of leaves, × 4, from Cooper County, Missouri, *Bush*, no. 15,137; FIG. 3, portion of fruiting branch, showing diffuse habit, × 1, from vicinity of Nashville, Tennessee, September, 1885, *Gattinger*.

PLATE 856. R. HUMILIS, forma GRISEA Fernald: FIG. 1, portion of TYPE, showing characteristic habit of the species, × 1; FIG. 2, internode and bases of leaves, × 4, from TYPE.

PLATE 857. R. HUMILIS, var. FRONDOSA Fernald: FIG. 1, TYPE, × ½; FIG. 2, summit of internode and bases of leaves, × 4, from Cleveland, Ohio, 1895, *Starr;* FIG. 3, flowering node, × 1, from Milford, Ohio, June 17, 1916, *E. L. Braun;* FIG. 4, flowering node, × 1, from Chambersburg, Pennsylvania, August 27, 1897, *T. C. Porter;* FIG. 5, flowering node, × 1, from Corydon, Indiana, *Friesner*, no. 14,369; FIG. 6, fruiting node, × 1, from Clinton, Iowa, *Pammel*, no. 77; FIG. 7, calyx and capsule, × 2, from Champaign, Illinois, *A. S. Pease*, no. 12,420.

PLATE 858. R. HUMILIS, var. LONGIFLORA (Gray) Fernald: FIG. 1, two flowering branches, × 1, from Piasa, Illinois, 1905, *G. E. McClure;* FIG. 2, summit of flowering branch, × 1, from Wichita, Kansas, 1892, *H. R. Pease;* FIG. 3, flowering summit, × 1, from Huntsville, Texas, *R. A. Dixon*, no. 377;

FIG. 4, summit of internode and bases of leaves, × 4, from Willis, Texas, *L. R. Warner;* FIG. 5, bracts, calyces and fruits, × 2, from north of Seagoville, Texas, *Lundell,* no. 11,679.

PLATE 859. R. HUMILIS, var. EXPANSA Fernald: FIG. 1, flowering node, from TYPE, × 1; FIG. 2, median fruiting node of primary axis, × 1, from Oquawka, Illinois, *Patterson;* FIG. 3, internode and leaf-base, × 4, from McDonald Co., Missouri, *Bush,* no. 282; FIG. 4, calyx and capsule, × 2, from Hendrix, Illinois, August, 1904, *B. L. Robinson.*

PLATE 860. R. HUMILIS, var. CALVESCENS Fernald: FIG. 1, portion of ISOTYPE, × 1; FIG. 2, flowering tip, × 1, from near Burnside, Kentucky, *Biltmore Herb.,* no. 489[k]; FIG. 3, internode and leaf-bases, × 4, from near Manchester, Tennessee, *Biltmore Herb.,* no. 849[f]; FIG. 4, lower surface of leaf, × 10, from Middletown, Frederick Co., Virginia, *Hunnewell,* no. 17,561; FIG. 5, fruiting nodes, × 1, from no. 17,561; FIG. 6, calyx and capsule, × 2, from north of Leavenworth, Crawford Co., Indiana, *Deam,* no. 33,429.

PLATES 861, 862 and 863. R. CAROLINIENSIS (Walt.) Steud., var. TYPICA. PLATE 861, FIG. 1, portion of flowering plant, × 1, from Ormond, Florida, *H. A. Purdie;* FIG. 2, flowering tip, × 1, from Brookgreen Gardens, Georgetown Co., South Carolina, *F. H. Tarbox,* no. 567; FIG. 3, summit of internode, × 4, from no. 567; FIG. 4, lower surface of leaf, × 10, from Green Cove Springs, Clay Co., Florida, *W. A. Murrill;* FIG. 5, upper surface of leaf, × 10, from same specimen. PLATE 862, FIG. 1, portion of summit, with flowers hardly developed, × 1, to show characteristic divergent branching, from Newberry, Alachua Co., Florida, *E. P. Walker.* no. 1862; FIG. 2, calyx and capsule, × 2, from east of Eustis, Florida, *Small,* no. 8667; FIG. 3, portion of calyx and capsule, × 10, from no. 8667. PLATE 863: copy of the plate, slightly reduced, of *R. strepens, capitulis comosis* of Dillenius.

PLATE 864. R. CAROLINIENSIS, var. SEMICALVA Fernald: FIG. 1, TYPE, × 3/7; FIG. 2, portion of internode, × 10, from TYPE; FIG. 3, lower surface of leaf, × 10, from TYPE; FIG. 4, upper surface of leaf, × 10, from TYPE; FIG. 5, calyx and capsule, × 2, from Iola, Florida, May, 1896, *Chapman;* FIG. 6, calyx-segment and portion of capsule, × 10, from last.

PLATES 865 and 866. R. CAROLINIENSIS, var. MEMBRANACEA Fernald: PLATE 865, FIG. 1, TYPE, × ½; FIG. 2, upper surface of leaf, × 10, from Savage Neck, Northampton Co., Virginia, *Fernald & Long,* no. 5453; FIG. 3, lower surface, × 10, from no. 5453; FIG. 4, flowering tip, × 1.7, from below Rushmere, Isle of Wight Co., Virginia, *Fernald & Long,* no. 13,150; FIG. 5, portion of calyx and capsule, × 10, from no. 13,150; FIG. 6, fruiting summit, × 2, from Claremont, Virginia, *Fernald & Long,* no. 13,837. PLATE 866, summits to show variations of leaves, × 1: FIG. 1, from Little Creek, Princess Anne Co., Virginia, *Fernald & Long,* no. 4193; FIG. 2, from Congress Heights, District of Columbia, *Philip Dowell,* no. 7012; FIG. 3, from Cold Spring, Cape May Co., New Jersey, *C. S. Williamson.*

PLATE 867, FIGS. 1–3. R. CAROLINIENSIS, var. MEMBRANACEA, forma HYPOPSILA Fernald: FIG. 1, summit, × 1.7, of TYPE; FIGS. 2 and 3, upper and lower surfaces of leaves, × 10, from TYPE. FIGS. 4–6, forma BREVIBERBIS Fernald: FIG. 4, internode and leaves, × 1.7, from Wolf Creek, Tennessee, *Kearney,* no. 863; FIGS. 5 and 6, upper and lower leaf-surfaces, × 10, from no. 863.

PLATE 868. R. CAROLINIENSIS, var. MEMBRANACEA, forma LAEVIOR Fernald: FIG. 1, fruiting summit, × 1.7, of TYPE; FIGS. 2 and 3, upper and lower surfaces of leaf, × 10, from TYPE; FIG. 4, portion of calyx-segment and capsule, × 10, from TYPE.

PLATE 869. R. CAROLINIENSIS, var. NANELLA Fernald: FIG. 1, TYPE, × 1; FIGS. 2 and 3, upper and lower surfaces of leaf, × 10, from TYPE; FIG. 4, flower-bud, with folded bract and 2 calyx-segments, × 10, from TYPE; FIG. 5, portion of calyx-segment and capsule, × 10, from TYPE.

PLATE 870, FIG. 1. R. CAROLINIENSIS, var. NANELLA: internode and base of leaf, × 4, from TYPE. FIGS. 2–4, var. NANELLA, forma ECILIATA Fernald:

FIG. 2, TYPE, × 1; FIG. 3, portion of leaf, bracts and internode, × 10, from TYPE; FIG. 4, portion of calyx-segment and capsule, × 10, from TYPE.

PLATES 871 and 872. R. CAROLINIENSIS, var. CHELONIFORMIS Fernald: PLATE 871, FIG. 1, TYPE, × 5/12; FIG. 2, corolla, × 1, from Cold Spring, Cape May Co., New Jersey, *Van Pelt;* FIG. 3, calyx and capsule, × 2, from Virginia Beach, Virginia, *Fernald & Long,* no. 4191; FIG. 4, bract, calyx-segment and portion of capsule, × 10, from no. 4191. PLATE 872: FIG. 1, summit, × 1, from Scuppernong, Washington Co., North Carolina, *Correll,* no. 1918; FIG. 2, portion of summit, × 1, from Cold Spring, New Jersey, *Van Pelt;* FIGS. 3 and 4, upper and lower leaf-surfaces, × 10, from *Fernald & Long,* no. 4191.

PLATE 873. R. CAROLINIENSIS, var. SALICINA Fernald: FIG. 1, TYPE, × 4/7; FIG. 2, summit of plant, × 1, from Louisiana, *Steinhaur;* FIG. 3, plant, × 1, from River Junction, Gadsden Co., Florida, *Wiegand & Manning,* no. 2933.

PLATES 874 and 875. R. CAROLINIENSIS, var. DENTATA (Nees) Fernald: PLATE 874, FIG. 1, small plant, × ⅖, from Broadwater Bridge, Isle of Wight Co., Virginia, *Fernald & Long,* no. 13,460; FIG. 2, summit of branch, × 1, from no. 13,460; FIG. 3, portion of fruiting branch, × ½, from Rehoboth, Delaware, *Churchill.* PLATE 875, FIG. 1, upper fifth of main axis, × 1, from Marsh's Millpond, Nansemond Co., Virginia, *Fernald & Long,* no. 14,414; FIG. 2, summit of branch, × 1, from Sweeden, Edmonson Co., Kentucky, *E. L. Braun,* no. 3593.

INDEX

New scientific names are printed in full-face type

Anonymos caroliniensis 31, 71, 77, 85

Blechum, 11; Tweedyi, 11

Calophanes humistrata, 82
Cryphiacanthus acaulis, 10, 11; angustifolius, 8–12; angustifolius Tweedianus, 9, 10; barbadensis, 24, 27

Dipteracanthus, 32; ciliosus, 32, 34, 36, 38, 50, 52, 74, β. dentatus, 82, β. hybridus, 71, γ. parviflorus, 2, 86, var. parviflorus, 27, 31, 32, 75; Drummondii. 56, 57; hybridus, 81; micranthus, 17–19; Mitchillianus, 71, 72, 86; noctiflorus, 49, 50, β. humilis, 51; spectabilis, 11; strepens, 14, 52, 58, 60, 82, var. calycinus, 14, γ. Dillenii, 71, var. pedunculatus, 14, 17, var. strictus, 14, 17; strictus, 14
Dizygandra noctiflora, 49; tubiflora, 49
Dyschoriste oblongifolia, 60, 63

Hygrophila illinoiensis, 17, 18

Pattersonia caroliniensis, 71

Ruellia acaulis, 10; angustifolia, 8, 10, 11; biflora, 14; **Brittoniana,** 5, **7**–9, 11–13, 87, pl. **839;** caroliniensis, 2–4, 7, 28, 30–33, 35, 52–57, 59, 61, 69, 75, 84–86, f. alba, 54, var. **cheloniformis,** 25, 70, 74, **80,** 84–86, 90, pls. **871, 872,** var. **dentata,** 25, 69, 71, 73, 74, **82,** 84–86, 90, pls. 874, 875, var. **membranacea,** 25, 70, 74, **75,** 78–81, 84–86, 89, pls. **865, 866,** f. **breviberbis,** 70, **78,** 89, pl. **867,** f. **hypopsila,** 70, **78,** 89, pl. **867,** f. **laevior,** 70, **79,** 80, 89, pl. **868,** var. **nanella,** 25, 70, 74, 77, **79,** 80, 84, 89, pls. **869, 870,** f. **eciliata,** 70, **79,** 89, pl. **870,** var. parviflora, 28, 29, 71, 86, var. **salicina,** 25, 70, 74, **81,** 84, 85, 90, pl. **873,** var. **semicalva,** 25, 69, **73,** 82, 84, 85, 89, pl. **864,** f. **detonsa,** 69, **74,** var. **typica,** 25, 69, **71,** 73, 84–86, 89, pls. 861–863; ciliosa, 3, 6, 23, 25, 28, 29, 31–38, 47, 51–54, 56, 58–62, 71–75, 79, 81–83, 85, 88, pls. 849, 850, var., 32, var. ambigua, 16, 28–30, 72, 74, 82, var. **cinerascens, 48,** var. humilis, 51, 53, var. hybrida, 27, 29, 52, 71, 72, 82, var. longiflora, 36, 51, 56–60, var. parviflora, 52; Drummondiana, 2, 30; foliosa, 14; geminiflora, 9, var. humilis, 10; **heteromorpha,** 6, 25, **32**–35, 87, pls. **847, 848;** hirsuta, 51, 59, 62; humilis, 2, 3, 7, 28, 31, 33–38, 48, 50–54, 56, 58, 60–62, 72, 77, 80, 82, 85, pl. 854, var. **calvescens,** 25, 51, 52, **60,** 63, 89, pl. **860,** var. **expansa,** 25, 51, **58,** 62, 89, pl. **859,** var. **frondosa,** 25, 51, **54,** 82, 88, pl. **857,** var. **longiflora,** 25, 37, 51, **56,** 60, 62, 63, 88, pl. 858, var. **typica,** 25, **51,** 54, 88, pls. 854, 855, f. **alba, 54,** f. **grisea,** 51, **54,** 88, pl. **856;** hybrida, 2, 28, 31–34, 36, 71, 72, 77, 86; longiflora, 26, 49; malacosperma, 8, 9, 13; Morongii, 10, 11; noctiflora, 3, 7, 25, 49, 50, 57, 62, 63, 88, pls. 852, 853; nudiflora, 2; oblongifolia, 14, 55; Parryi, 2; parviflora, 2, 26–29, 31–33, 35, 37, 52–54, 60, 61, 72–75, 80–82, 86; "parviflora", 49; pedunculata, 3, 5, 21, 22, 24–28, 30, 31, 82, 85, 87, pl. 843; **pinetorum,** 5, **24**–27, 87, pl. **844; Purshiana,** 5, 25, **27,** 29–32, 75, 85, 87, pls. **845, 846,** f. **claustroflora,** 7, **29,** 87, pl. **846;** spectabilis, 8, 10–12; strepens, 2, 3, 5, 13, 15, 19–22, 25–30, 32, 36, 52, 55, 58, 60, 61, 71–83, 85, 87, pl. 841, var., 52, capitulis comosis, 19, 20, 71, 89, pl. 863, f. cleistantha, 6, 17, 20, 21, 87, pl. 842, var. cleistantha, 17, 20, 29, micrantha, 17; succulenta, 3, 6, 25, 48, 49, 88, pl. 851; tubiflora, 49, 50, 88; Tweediana, 8–13, 87, pl. 840; Tweedyi, 11; vincaeflora, 14

Photo. B. G. Schubert.

RUELLIA BRITTONIANA: FIG. 1, summit of plant, × 1; FIG. 2, summit of peduncle and calyx, × 4; FIG. 3, corolla, × 1; FIG. 4, calyx and capsule, × 2.

Photo. B. G. Schubert.

RUELLIA TWEEDIANA: FIGS. 1 and 2, portions of branching plant, × 1; FIG. 3, summit of peduncle and base of calyx, × 4; FIG. 4, tip of calyx-segment, × 10; FIG. 5, corolla, × 1.

Photo. B. G. Schubert.

RUELLIA STREPENS: FIG. 1, flowering median node, × 1; FIG. 2, corolla, with one basal bract removed, × 1; FIG. 3, flower, showing broad calyx-segment, × 1; FIG. 4, long-peduncled fruit, × 1.

Photo. B. G. Schubert.

RUELLIA STREPENS, forma CLEISTANTHA: FIG. 1, summit of plant, × ⅖; FIG. 2, terminal glomerule, × 1; FIG. 3, node with large cleistogamous flower, × 2; FIG. 4, terminal glomerule with two small cleistogamous flowers, × 2; FIG. 5, subterminal fruiting node, × 2; FIG. 6, calyx and open capsule, × 2.

Photo. B. G. Schubert.

RUELLIA PEDUNCULATA: FIG. 1, small flowering plant, × 4/9; FIG. 2, base of more branching fruiting plant, × ½; FIG. 3, portion of branching inflorescence, × 1; FIG. 4, calyx and capsule, × 2; FIG. 5, calyx-segments and base of capsule, × 10; FIG. 6, strigose surface of capsule, × 10.

Photo. B. G. Schubert.

RUELLIA PINETORUM: FIG. 1, flowering and fruiting branches from TYPE, × 1; FIG. 2, portion of fruiting branch, × 1; FIG. 3, portion of leafy base, × 1; FIG. 4, calyx and capsule, × 2; FIG. 5, surface of peduncle, × 10; FIG. 6, bases of calyx-segment and capsule, × 10.

Photo. B. G. Schubert.

RUELLIA PURSHIANA: FIG. 1, portions of TYPE, × 2/5; FIG. 2, third node from base, × 1; FIG. 3, second node from base, × 1; FIG. 4, calyx and capsule, × 2; FIG. 5, surface of stem, × 4.

Photo. B. G. Schubert.

RUELLIA PURSHIANA: FIG. 3, summit of capsule, showing pilose surface, × 10.
R. PURSHIANA, forma CLAUSTROFLORA: FIG. 1, summit of type, × 1; FIG. 2, uppermost node, with small cleistogamous flowers (above) and capsule, × 2.

Photo. B. G. Schubert.

RUELLIA HETEROMORPHA, vernal stage: FIGS. 1–3, portions of flowering stems, × 1; FIG. 4, summit of internode and base of leaf, × 4; FIG. 5, base of calyx, × 10.

Photo. B. G. Schubert.

RUELLIA HETEROMORPHA, later cleistogamous stage: FIG. 1, portion of long fruiting branch, × 1; FIGS. 2 and 3, branchlets, × ½; FIG. 4, tip of branchlet, with two cleistogamous flowers, × 1; FIG. 5, calyces and capsules, × 2.

Photo. B. G. Schubert.

RUELLIA CILIOSA: FIGS. 1–3, plants, × 1; FIG. 4, summit of internode and base of cauline leaf, × 4; FIG. 5, calyx and capsule, × 2.

Photo. B. G. Schubert.

RUELLIA CILIOSA: FIG. 1, plant, × 1; FIG. 2, basal branch, × 1; FIG. 3, large-flowered branch, × 1.

Photo. B. G. Schubert.

RUELLIA SUCCULENTA: FIG. 1, portion of flowering plant, × ⅔; FIG. 2, fruiting branch, × 1; FIG. 3, summit of internode and bases of leaves, × 4; FIG. 4, lower surface of leaf, showing cystoliths, × 10; FIGS. 5 and 6, median and terminal flowering nodes, × 1; FIG. 7, calyx and fruit, × 2

Photo. B. G. Schubert.

RUELLIA NOCTIFLORA: FIG. 1, base of plant, × 1; FIGS. 2, 3 and 4, flowering tips, × 1 (FIG. 3, ISOTYPE); FIG. 5, summit of internode and bases of leaves, × 4; FIG. 6, calyx and capsule, × 2

Photo. B. G. Schubert.

RUELLIA NOCTIFLORA: FIG. 1, summit of flowering stem of probable TYPE of *R. tubiflora*, × 1; FIG. 2, fruiting summit, × 1.8; FIG. 3, bract, calyx-segment and base of capsule, × 10; FIG. 4, surface of capsule, × 10

Photo. B. G. Schubert.

RUELLIA HUMILIS, var. TYPICA: FIG. 1, TYPE OR ISOTYPE, × 1; FIG. 2, summit of primary axis, × 1; FIG. 3, calyces and capsules, × 2

Photo. B. G. Schubert.

RUELLIA HUMILIS, var. TYPICA: FIG. 1, median nodes of primary axis, × 1; FIG. 2, summit of internode and bases of leaves, × 4; FIG. 3, portion of fruiting branch, showing diffuse habit, × 1

Photo. B. G. Schubert.

RUELLIA HUMILIS, forma GRISEA: FIG. 1, portion of TYPE, × 1; FIG. 2, internode and bases of leaves, × 4

Photo. B. G. Schubert.

RUELLIA HUMILIS, var. FRONDOSA: FIG. 1, portion of TYPE, × ½; FIG. 2, summit of internode and bases of leaves, × 4; FIGS. 3–5, flowering nodes, × 1; FIG. 6, fruiting node, × 1; FIG. 7, calyx and capsule, × 2

Photo. B. G. Schubert.

RUELLIA HUMILIS, var. LONGIFLORA: FIGS. 1–3, summits of flowering branches, × 1; FIG. 4, summit of internode and bases of leaves, × 4; FIG. 5, bracts, calyces and fruits, × 2

Photo. B. G. Schubert.

RUELLIA HUMILIS, var. EXPANSA: FIG. 1, flowering node, × 1, from TYPE; FIG. 2, median fruiting node, × 1; FIG. 3, internode and leaf-base, × 4; FIG. 4, calyx and capsule, × 2

Photo. B. G. Schubert.

RUELLIA HUMILIS, var. CALVESCENS: FIG. 1, portion of ISOTYPE, × 1; FIG. 2, flowering tip, × 1; FIG. 3, internode and leaf-bases, × 4; FIG. 4, lower surface of leaf, × 10; FIG. 5, fruiting nodes, × 1; FIG. 6, calyx and capsule, × 2

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. TYPICA: FIG. 1, portion of flowering plant, × 1; FIG. 2, flowering tip, × 1; FIG. 3, summit of internode, × 4; FIG. 4, upper surface of leaf, × 10; FIG. 5, lower surface of leaf, × 10

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. TYPICA: FIG. 1, summit of plant, to show characteristic divergent branching, × 1; FIG. 2, calyx and capsule, × 2; FIG. 3, portion of calyx and capsule, × 10

Copy, slightly reduced, of the Dillenian plate of RUELLIA STREPENS, CAPITULIS COMOSIS

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. SEMICALVA: FIG. 1, TYPE, × 3/7; FIG. 2, portion of internode. × 10; FIG. 3, lower, and FIG. 4, upper surface of leaf, × 10; FIG. 5, calyx and capsule, × 2; FIG. 6, calyx-segment and portion of capsule, × 10

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. MEMBRANACEA: FIG. 1, TYPE, × ½; FIG. 2, upper, and FIG. 3, lower surface of leaf, × 10; FIG. 4, flowering tip, × 1.7; FIG. 5, portion of calyx and capsule, × 10; FIG. 6, fruiting summit, × 2

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. MEMBRANACEA: FIGS. 1–3, summits of plants, to show leaf-variation, × 1

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, VAR. MEMBRANACEA, forma HYPOPSILA: FIG. 1, summit, × 1, of TYPE; FIG. 2, upper, and FIG. 3, lower surface of leaf, × 10

VAR. MEMBRANACEA, forma BREVIBERBIS: FIG. 4, internode and leaves, × 1.7; FIG. 5, upper, and FIG. 6, lower surface of leaf, × 10

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. MEMBRANACEA, forma LAEVIOR: FIG. 1, fruiting summit, × 1.7, of TYPE; FIG. 2, upper, and FIG. 3, lower surface of leaf, × 10; FIG. 4, portion of calyx-segment and capsule, × 10

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. NANELLA: FIG. 1, TYPE (2 plants), × 1; FIG. 2, upper, and FIG. 3, lower surface of leaf, × 10; FIG. 4, flower-bud, with folded bract and 2 calyx-segments. × 10; FIG. 5, portion of calyx-segment and capsule, × 10

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. NANELLA: FIG. 1, internode and base of leaf, × 4
R. CAROLINIENSIS, var. NANELLA, forma CILIATA: FIG. 2, TYPE (3 plants), × 1; FIG. 3, portion of leaf, bracts and internodes, × 10; FIG. 4, portion of calyx and capsule, × 10

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. CHELONIFORMIS: FIG. 1, TYPE, × 5/12; FIG. 2, corolla, × 1; FIG. 3, calyx and capsule, × 2; FIG. 4, bract, calyx-segment and portion of capsule, × 10

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. CHELONIFORMIS: FIGS. 1 and 2, flowering summits, × 1; FIG. 3, upper and FIG. 4, lower surface of leaf

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. SALICINA: FIG. 1, TYPE, × 4/7; FIGS. 2 and 3, summits of plants, × 1

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. DENTATA: FIG. 1, small plant, × ⅖; FIG. 2, portion of branch, × 1; FIG. 3, portion of fruiting branch, × ½, to show characteristic branching

Photo. B. G. Schubert.

RUELLIA CAROLINIENSIS, var. DENTATA: FIGS. 1 and 2, flowering summits, × 1